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EDITORIAL NOTES—GAS, &c.

Imperial Continental Gas Association—Maintenance and Vertical Retorts.

IT would indeed be passing strange if, in the variegated conditions which go to make up the working of that gigantic concern the Imperial Continental Gas Association, each half year did not yield matters both interesting and instructive to others than the proprietors of the concern. The report of the Directors, and the speech of the Chairman (Mr. J. Horsley Palmer), to the proprietors last Tuesday, were featured in both respects. The Association—through the Board and their officials—have, during the past half year, had their good fortune, their anxieties, and their difficulties. The difficulties were in part common to all gas undertakings, and in part the outcome of the Association's peculiar conditions. Upon the latter, diplomacy, for which the Board hold high record, was brought to bear. Touching the good fortune, the business in gas advanced by no less than 7·21 per cent.; and including the small amount brought forward, the profit for the half year was £238,640 (which was an increase of nearly £10,000), and the balance carried forward is more than £11,000 greater than the sum brought into the half year. The increase in business and the increase in profits, however, are not co-ordinate. But this is due to various causes—the rise in the cost of coal by 9·13d. per metric ton, the increase in wages by nearly £5000, and several other expenditure advances which the Chairman detailed. The extra receipts for residuals (tar returned less) made the net advance in the cost of coal 7·55d. per metric ton. We have referred here more particularly to these figures because they lead up to a matter to which the Chairman alluded with some degree of disappointment.

Before alluding to that special matter, however, there are one or two other points upon which it would have been interesting to have had some further elucidation from the chair. Coal has cost more in the past half year; and the Chairman intimated that, in common with all other purchasers of coal, higher prices still would have to be paid this year. Perhaps it would not have been good policy to have done so at the present time, but it would certainly have been extremely interesting to all British gas administrators, in view of the condition of affairs in the home coal market, to have had some information as to whether or not the division of the Association's purchases between British coal and coal native to the countries in which the operations of the Association are conducted, would this year be about on normal lines. Another point was as to the decrease in the price received for tar. In one direction, we understand, there is a decline in the demand for tar in Germany; and therefore it would be of interest to learn whether anything is being done in that country in developing the employment of tar for road purposes—a use which holds out such substantial promise in this country. One other matter which will strike the inquisitive as worthy of explanation is that, while the number of ordinary meters connected increased by 42,780 and prepayment meters by 16,707—together an increase of 59,487—the total number of consumers on the books of the Association exhibited an augmentation of only 38,652; so that between the total increase of meters and of consumers there is to the outsider an unaccounted-for difference of 20,835. No doubt this is easy of explanation; but the explanation is not apparent on the bare figures.

The point on which there was a note of disappointment in Mr. Horsley Palmer's address was as to the question of maintenance, which has increased by £10,500. He appears to debit this entirely to the extended use of labour-saving plant at the works. The general explanation the Chairman vouchsafed to the proprietors may be satisfactory to them, but it does not go far enough for professional men who have, in most gas-works in latter years, pinned their faith to such appliances, and claim, and prove by their figures, to have derived from them substantial advantage in working costs. It is a question that cannot be dismissed by mere generalities. Mr. Horsley Palmer does not find—obviously by looking at the accounts generally—that, taking the increased cost of maintenance into consideration, and the advance in wages to the men who are now employed, the direct benefit from the plant is such as was expected. He only sets to the credit of the plant the employment of fewer hands, and the greater immunity from labour troubles; and somewhat loathly he accepts the result as a set-off, but not, having regard to the cost, as a financial equivalent. In this the Chairman is, it would appear from his mode of dealing with the subject, according too little credit to the plant. We read in the report, as we have read in the reports for many years past, of large extensions of works, and of a considerable increase in the business; and is it not natural that, apart from the labour-saving plant, both the charge for maintenance and for wages should, under such circumstances, ascend? Further, twelve months ago there was great unrest in the labour world of Continental countries, which resulted in a rise of wages. There would have been that rise whether or not labour-saving machinery had been employed in the Association's works; and therefore, to now lay it to the charge of the labour-saving machinery, that it required more skilled and higher-priced men is only telling half the tale. Without the labour-saving machinery, a considerable number of additional men, commanding wages on a higher scale than formerly, would be required; and therefore the savings of the machinery must be calculated both on the higher scale of wages, and on the increased number of highly-paid men that would be necessary to deal with the heavier weights of material needed for the increased business and the extra work generally that has to be performed. The wages bill alone, however, does not supply the whole test in connection with labour-saving appliances. And to enable proper judgment to be made as to the justness of the complaint of the Chairman, that the Association are not feeling the full benefits that they had anticipated from adopting the plant, there must be a complete detailed statement of the whole costs from start to finish on the bases of per ton of coal handled and per 1000 cubic feet of gas made, with a comparison of the costs obtaining just anterior to the application of mechanical means of accomplishing the same operations, *plus* (to make the comparison fair) the increase in the rates of wages. However, this we do know, from figures appearing in a valuable article in the "JOURNAL" for Feb. 12 (pp. 400-1), that in Berlin the modern coke plant is fully justifying the investment in it.

It will be seen from the report that the Board are now so well convinced as to the possibilities of vertical retorts that they have endorsed the recommendation of their Chief Engineer at Berlin (Herr E. Körting) to instal seven beds of eights in the second large retort-house at Mariendorf. These retorts will be on a larger scale and individual capacity than anything that has yet been erected in Germany on the Dessau system, excepting for experimental work. But it will be observed, in the few brief references the Chairman made to the subject, that he was careful not to say anything that was likely to compromise him in the future. The retorts, he stated, have passed the experimental stage, and are working in a "fairly satisfactory" manner. We do not want to make overmuch of the qualifying expression "fairly;" but it was deliberately used, and may have significance. Moreover, one of the Directors, who has been on a visit to towns where the system is in use, testifies to structural and mechanical success, to perfect heats, and to simple charging; but the system, he says, has not been in operation sufficiently long to know whether the financial aspects of the working over a series of years would be as satisfactory as the methods that have been in vogue at the Association's stations now for many years. We do not know which of the Directors made this report; but whoever he may be,

between his views and those expressed in these columns in the past there is not any material difference. Between him and us, however, there is this difference—that we have been roundly, though ineffectually, chided by friends in Germany for expressing such views; so far as we know, the Director has not been. We could not nearly nineteen months ago, and the Director in queston cannot to-day, accept everything as proved beyond doubt in connection with the Dessau vertical retort system. Surely, now, we may be forgiven.

"Cokite"—Gas Undertakings and Smokeless Fuel.

WEDNESDAY last was an eventful day in the smokeless fuel campaign. Mr. Paul Schlicht read a paper, of which a report appears in other columns of the "JOURNAL," before the Society of Arts, on "The Production of Coke and its "Application to Domestic Fires;" "The Times" Engineering Supplement contained an interesting article on "The New Fuel, Coalite;" and the "South Wales Daily "News" on the same day reported that a new "Smokeless "Patent Fuel" was in the field as a rival to "Coalite."

Mr. Schlicht recommended that bye-product coke-ovens should be adapted and operated with a view to the production of coke suitable for use in domestic grates. It is well known that the modern coke-oven admits of the manufacture of widely differing grades of coke, and that it would be feasible to use it to supply coke for domestic or industrial purposes as well as for the metallurgical use to which its operations have hitherto been almost solely confined in this country. With proper attention, moreover, coke more suitable than ordinary gas coke for household use could doubtless be produced. If there had been a demand for such coke, it would surely have been forthcoming long since. When Mr. Schlicht or the Smoke Abatement Society has succeeded in creating a demand for coke, of any grade whatsoever, for domestic consumption, over and above the demand now existing for gas coke, the gas undertakings of the country will be prepared to meet that demand. This remark applies equally to Mr. Schlicht's domestic coke and our old acquaintance "Coalite." "The Times," indeed, indicates the real obstacle to the success of either in a paragraph anent "Coalite," which deserves quotation in full—

> The question which, however, must determine the future of "Coalite," is not one respecting its physical and chemical properties, but the much weightier consideration as to whether it is possible to prepare coal by any known process of distillation, and sell the partially distilled contents of the retort at a price which will ensure a profit. For it is to be noted that this is a proposition in which a bye-product is to be elevated to the position of a staple manufacture. In gas manufacture, coke is a bye-product; in the manufacture of "Coalite," the residue in the retcrt is to be the staple, and the gas and tar are bye-products. This is an inversion of the respective *rôles* of these two substances which is distinctly novel, and the financial success of such a complete reversal of ordinary practice must be in the nature of an unsolved problem.

The next paragraph is also instructive—

> It is quite certain that very few people will purchase "Coalite" out of any patriotic or æsthetic feelings; and the majority of Londoners and the inhabitants of other great cities will not be moved by any higher motives than those which their pocket dictates. Even though it may be granted that the universal use of any form of smokeless fuel would abolish much of the dust, dirt, and discomfort of our cities, it is certain that, unless "Coalite" can be offered at a price which not only competes with, but is actually less than, that of average quality coal, it will not find favour, except among the very few who place æsthetic above pecuniary consideration.

These two paragraphs are in close agreement with what was written in the "JOURNAL" some weeks ago; and we are glad to find ourselves supported by the leading daily paper—in an article for which there is editorial responsibility, and not in the article-advertisements that have been published—in a matter in which the rest of the Press has, almost without exception, more or less actively backed the other side. The fact remains that there is no considerable domestic demand for a smokeless solid fuel at present; that an increased demand for it can only be created by offering it at an appreciably lower price than coal; and that gas-works have already a surplus production of coke ready to meet any such demand whenever it may arise. It should be remembered that many gas undertakings have it in their power, in virtue of their carburetted water-gas plant, to vary their available output of coke so as to take advantage of the fluctuations in the market for it.

"The Times" quotes a report by Professor Vivian B. Lewes to the effect that "Coalite" has a calorific value of 13,500 B.Th.U. per lb., as compared with an average of 14,800 B.Th.U. per lb. for coal as ordinarily used in domestic fires. But, owing to the fact that the heat of the coal is partly used in decomposing and volatilizing the hydrocarbons of the coal and the water formed by their combustion, not more than 7500 out of the 14,800 B.Th.U. of the coal can be rendered available in the domestic grate, as against 13,000 B.Th.U. in the case of "Coalite." That is, we would point out, to argue that the domestic grate is carbonizing coal much as a retort or oven is carbonizing it to form "Coalite;" and, to make the comparison exact, the B.Th.U.'s available from the "Coalite" produced from a pound of coal should be taken instead of the B.Th.U.'s available from a pound of "Coalite." It is here a question of the domestic grate *versus* the "Coalite" oven as a carbonizer. The fuel expended in the carbonization process must not be reckoned in the one case and omitted in the other, for the consumer must ultimately pay for it in both.

Professor R. H. Smith, of the University of Birmingham, is quoted by "The Times" as having found that the rate of consumption of coal by weight must be 1·69 times that of "Coalite" to provide an equal fire in respect of radiated heat. Here, again, the comparison should be with the amount of coal used in producing the "Coalite," and not with the "Coalite" itself. The coal fire, strangely enough, was stoked twice as often as the "Coalite" fire; so that obviously with it the carbon never had the opportunity of attaining an equal radiating efficiency owing to the fresh layer of uncarbonized fuel which was put upon it. What is such a comparison worth? According to "The Times," "the *crux* "of the situation must depend upon whether it is possible "to convert cheap slack or coal-dross into a hard, tough, "and valuable fuel, which has the special advantages "claimed for 'Coalite.'" Quite so; but the cost of conversion must not be neglected when the financial aspect of the "Coalite" scheme is under consideration. In this connection, the scheme of the Cardiff Smokeless Fuel Company becomes interesting. The idea is to make smokeless briquettes from South Wales steam small, with an addition of 5 per cent. of tar. They are, of course, to be produced in the neighbourhood of the steam-coal pits, and not in every town in the United Kingdom. The "Coalite" scheme would be more promising if it were intended to produce "Coalite" near the pit's mouth, where carriage on the fuel required for carbonizing the coal would be saved. The only product of the carbonization of coal which cannot be transported to the place of consumption as economically as the original coal is gas, and the agencies for the disposal of surplus gas are limited and independent.

There seems to be an impression abroad that, if the gas undertakings of the United Kingdom find it advisable to modify the quality of the coke they produce, or alter their type of gas-making plant, they will have to make arrangements with exploiters of "Coalite" or coke-oven schemes, who will benefit accordingly. But the way is open for gas undertakings to work out their own salvation without adventitious aid, as and when further efforts in that direction have to be made. General knowledge and past practice, together with the acquaintance with gas-works conditions which only the gas engineer has, should render the latter independent of extraneous help in adapting his plant and processes to changing conditions. It is from within the gas industry that the ideal gas-making plant of the future will almost certainly come.

Mr. Schlicht concluded his paper before the Society of Arts with a reference to a mode of supplying heated air to the upper layer of the fuel of fires by way of the chimney. It is apparently applicable to either coke or coal fires, in closed stoves or open grates, and certainly seems worthy of investigation, apart from the exploitation of any particular grade of coke or other solid fuel.

Regulated Rate Contributions.

THERE has been a good crop of discussions lately on the question of the relief of rates from the profits of municipal gas undertakings; and we are not in the least sorry to see this revival of remonstrance against a system that, indefensible in the past, is—we say it emphatically—more so in the present. The conditions of municipal administration have undergone a complete change, through the introduction into their trading adventure of undertakings that are competitive; and the system of relieving the rates from those undertakings on a system that is unregulated by anything but the requirements of the dictators in municipal affairs

has brought about an inequality in the spread of the municipal burden that ought not to be allowed to continue, and which it is in the power of every Council to adjust if the members only chose to so will. Contributions to the rates are, in the Acts of Parliament governing the financial dealings of municipal trading enterprises, permissive, if excess profit there be, and not obligatory. Therefore it is in the power of every trading municipal body to remedy the well-founded grievance that several Chairmen of Gas Committees have brought before their corporate colleagues, either by conceding the only thing that does full justice—abolish all contributions to the rates from those trading undertakings that have not demanded anything from the rates, or, if they have demanded anything, have discharged the obligation by repayment, or by, if contributions to the rates must be exacted from the undertakings, producing equality for the customers of competing undertakings by having a uniform contribution from each—say, a definite percentage on the capital employed.

We hear of large towns in which considerable sums are extracted from the gas consumers for rate relief; while those extracted for similar purpose from the electrical consumers are comparatively moderate, or the consumers go scot free. But nevertheless the electricity consumers enjoy the relief afforded by the profits taken from gas consumers, towards which, in many cases, they have not contributed anything. The gas consumer, in short, is made the packhorse for everything in some towns—such, for example, as Rotherham. It is a reproach to the Corporation of that town that the additional 3d. put on to the price of gas in 1900 should still be charged, that the consumers should have to pay for the public lighting, that they should contribute £500 to the deficit of the Water Department, and that they should then be made to contribute to the rates an amount which ought to be utilized in reducing the monstrous price, in normal times, of 2s. 9d. per 1000 cubic feet of gas for such a town, and so favourably circumstanced as Rotherham. The gas consumers bear all the legitimate financial burden of their undertaking; and they are compelled to bear in addition all that we have named. If there are such things as honest and dishonest ways of levying contributions to the municipal treasury, then Rotherham provides us with one of the illustrations of the latter. Every man, no matter how he obtains his artificial light, ought to bear his fair proportion of the financial liabilities of the town in which he resides. In our civic life, we are, as said before, under changed conditions; and it should now be a principle in the policy of municipal bodies that all ratepayers should share in responsibilities on a level standard. If, as we say, there are to be contributions from competitive undertakings, let them be on an equal basis—say, according to capital employed. If one undertaking has not the money to contribute, then the other should not be called upon to contribute anything. The Corporation who will set an example in producing fairness between ratepayer and ratepayer by regulating indirect as well as direct taxation, will win great favour from the gas consumers throughout the country.

Laying Mains on Railway Bridges.

In our "Legal Intelligence" will be found the report of a case of considerable importance to gas companies, which came before Mr. Justice Swinfen Eady in the Chancery Division of the High Court of Justice last Friday. It raised the question of the right of the Cardiff Gas Company to lay their pipes on a bridge crossing the line of the Taff Vale Railway Company; the bridge being the property of the latter, but forming part of the public highway from Whitchurch to Llandaff. The Railway Company applied for an injunction not only to restrain the Gas Company from laying their pipes, but to compel them to remove those already put down. The case was in the nature of a test one, as a number of bridges were concerned. Put shortly, the plaintiffs alleged that there was not sufficient room in the soil on the bridge to allow of the defendants' pipes being laid in it, and that consequently they rested upon the ironwork of the structure. This position, it was submitted, was contrary to the provisions of section 7 of the Gas-Works Clauses Act, 1847 (incorporated in the Company's Special Act), inasmuch as the pipes were laid "against a building." It was also alleged that the flanges of the pipes protruded above the suface of the original metalling; but that they were covered by a ridge running the whole length of the structure, so that the surface of the road was raised. It was acknowledged, however, that the pipes as laid had no effect on the stability of the bridge. For the defendants it was replied that, owing to the shallowness of the soil, they had to rest their pipes on the structure itself; and it was submitted that in doing this they were acting within their statutory powers, under which they were liable for any damage done. His Lordship, in giving judgment, pointed out that under section 6 of the General Act the defendants were authorized to break up the soil of streets and lay their pipes therein and also over bridges; and he expressed the opinion that the succeeding section, prohibiting the placing of pipes "against any building," did not preclude them from laying their pipes upon a "bridge" within the meaning of the preceding one. The two sections must, he said, be read together; and it was immaterial "whether the pipes had some small layer of dust or dirt between them and the iron plates and girders of the bridge, or were laid directly upon the structure." As to the allegation that a portion of the pipes projected above the surface of the road, he came to the conclusion that after they were laid the ground had been properly reinstated by the defendants. His decision, therefore, was that the action must be dismissed, with costs.

Gas and Electric Light in Fog.

One effect of the inquiry respecting the loss of the steamship *Suevic* at the Lizard has been to recall some reminiscences of the old controversy respecting the merits of different illuminants for lighthouses. As our readers are aware, Sir James Douglass and Mr. John R. Wigham, who took leading parts in the dispute as advocates respectively of electric light and gas, are both dead; but their representatives have shown a commendable desire that justice should be done to their memory and to the causes they favoured. Mr. Joshua W. Edmundson, a nephew of Mr. Wigham, who himself assisted in the South Foreland inquiry, contends with great justice that the wreck of the *Suevic* has demonstrated the truth of his uncle's contention that electricity as an illuminant is not to be compared with gas or oil when the weather is foggy. It is a somewhat costly lesson, and would have been even more so if circumstances had not favoured the landing of the passengers and crew. Mr. Edmundson points out that since the South Foreland experiments were carried out no important headlands have been found on which to place an electric light except that of St. Catherine's, in the Isle of Wight, which received the apparatus used experimentally at the South Foreland. The Lizard light, which, as already pointed out in the "JOURNAL" (*ante*, p. 288), cannot be discerned, even when the light of farmhouses is visible, is a new and powerful light, put up a few years ago in place of two electric lights of inferior power. But though more powerful, the light is apparently not more effective at times when it is most needed. One interesting fact recalled by Mr. Edmundson is that Mr. Wigham first came to the conclusion that the electric light is lost in fog, more than either gas or oil, 35 years ago, when he erected the signal-light on the Clock Tower at Westminster, in competition with an electric arc lamp. The gas and electric light were tested at a distance of eight miles on a foggy night, with the result that the gas was visible and the electric light could not be seen.

Conditions of Corporation Service.

An interesting report with regard to the terms and conditions of official appointments under the Manchester Corporation has been prepared by a Special Committee who have for some time been considering the matter, and has been adopted by the City Council. The report recommends that a system of preliminary examination shall be established, and that a minimum and maximum of salaries shall be fixed for the various offices held—increases to be on a scale and after periods of service to be subsequently determined when the Committee proceed with the preparation of a full scheme on the principles now laid down. It may, at the outset, be stated that the Committee recognize that there must be some notable exceptions to the salary regulations in the case of "officials whose business it is to initiate policies rather than solely one of administration." Whatever disadvantages there may be in the examination system, the salary proposal will at least enable officials to know exactly where they are; and the adoption of a similar method in some towns would put an end to discussions which are calculated to anything but enhance the popularity of municipal employment. In fact, in moving the adoption of the report by the Council, this point was

emphasized by Mr. Abbott, who said "the object was to get rid of the very disagreeable and unfortunate procedure of having to discuss the salaries of officials in the open council, when many members, not knowing what were the particular duties of the office, were unable to discuss the proposal effectively." There is, however, another side to the question, which was brought forward by Sir Bosdin Leech, who thought it would be a regrettable thing if all men were to rank alike, because under such a system the Corporation would not be likely to get the best service. The Committee's reply to this was that in public departments the system worked most smoothly. They did not say men should not be advanced, but that a certain office was worth a certain sum of money. All that was paid for were the duties of the office; and the heads of departments were always willing to recognize where, with advantage, a man could be removed from one office to another, where there was a larger salary. What they desired to avoid, it was declared, was "the annual wrangles that took place over salaries." There is, we should imagine, little doubt that, in this desire, the Committee will have the support of the officials concerned. Another feature of the scheme to be drawn up will be the fixing of a retiring age; and this will entail consideration of the advisability of making a grant in the shape of a lump sum or a pension. The Committee's report having been adopted, they will now, it may be assumed, proceed to formulate a complete scheme for submission to the Council; and for this it will be needful to wait, in order to see exactly what it is intended to do. Meanwhile, it may be pointed out—as showing that the suggestions are not entirely on new ground—that all or a portion of the recommendations are in operation in the London County Council, Birmingham, Glasgow, Liverpool, Oldham, St. Helens, and Salford.

The Tar-Spreading Competition.

As already announced in the "JOURNAL," the Roads Improvement Association have arranged to carry out, on behalf of the Royal Automobile Club and the Motor Union, a series of competitions with the view of ascertaining which is the best preparation of tar for road purposes, and the best machine for applying it. We have now received from Mr. Rees Jeffreys, the Hon. Secretary of the Association, the programme of the tests, which will be carried out (weather and the state of the roads permitting) from Wednesday to Friday next week. All the machines will be tested on three classes of roads—viz., macadam, flint, and gravel; the preparations on macadam only, unless more extended trials are found to be necessary. The particular roads upon which the tests will be made are—

(*a*) The Hounslow and Staines macadam road, between Baber Bridge and Staines boundary, under the control of the Middlesex County Council. (Length, four miles.)

(*b*) The flint road between Twickenham and Kempton Park, under the control of the Staines Rural District Council. (Length, two miles.)

(*c*) The gravel road between Virginia Water and Reading at Ascot, under the control of the Berkshire County Council. (Length, three miles.)

May 22.—Half the width of the Hounslow and Staines Road will be barricaded off, and each of the tar-spreading machines and each of the preparations of tar will be tested over approximately a quarter-mile stretch of this road. Arrangements will be made for a gang of men to sprinkle sharp sand over the treated road, so that the traffic may be turned back on this portion of the road the following day.

May 23.—In the morning the tar-spreading machines and preparations of tar will be again tested over the other half of the Hounslow and Staines Road. In the afternoon, the tar-spreading machines will be tested upon the flint road between Twickenham and Kempton Park. This road will be entirely closed to traffic, so that both sides can be covered during the afternoon.

May 24.—In the morning, all the tar-spreading machines will be tested over the gravel road from Virginia Water to Reading, at Ascot. In the afternoon, an invitation luncheon will be given by the Berkshire Automobile Club in the luncheon-room of the Grand Stand Enclosure at Ascot, to which will be invited representatives of the Government, the Houses of Parliament, Local Government Board, H.M. Office of Works, Scottish Office, Local Authorities, County, Borough, and District Surveyors, the competitors, the Roads Improvement Association, the Royal Automobile Club, the Motor Union, and its affiliated Clubs.

The death is reported to have taken place on April 27, of Herr PAUL TRENTLER, the Manager of the Municipal Gas-Works at Breslau. The deceased was 56 years old.

It is announced that Herr RUDOLPH JAHNKE, the Assistant-Manager of the Berlin Municipal Gas-Works, died on the 18th ult. He had acted as *locum tenens* for Herr Cuno in the management of the works.

NOTES FROM WESTMINSTER.

Water Schemes Almost Monopolize Consideration.

EVENTS in the Committee rooms last week have been mixed up between water and railways—the former predominating. The Lords Committees have been particularly strong on water; and the schemes that have been before them have not been by any means of small note. After the heavy preceding week, Earl Lauderdale and his colleagues got quit of the much-discussed Tynemouth Corporation Water Bill yesterday week, by declining to extend the area of supply. It will be remembered that the opposition to the Bill was against the clauses referring to the questions of area and supply in bulk. The Colne Valley Water Company carried their Bill from Lord Ribblesdale's Committee, by settling with the opponents the terms of a clause which will eventually effect uniformity of water-rate in their district, and bring in a totally new scale some five or six years hence. Having got rid of the Bill, the same Committee turned their attention to the one promoted by the Coventry Corporation for supplementing—the growth of population and industry having rendered this necessary—their water resources. A scheme for doing this has been arranged without much difficulty. Now that Birmingham has water in such plentitude from Wales, some of its supplies nearer home are in the nature of surpluses; and part of these the City Council are quite willing to let the Coventry Corporation have at the price of 4d. per 1000 gallons, with a minimum payment of £5000 a year. This means that Coventry will have to take 840,000 gallons a day. The works involved by this agreement are the laying of a trunk line of mains for conveying the water, and the construction of an additional covered reservoir at Coundon. The scheme is estimated to cost about £81,000. The Meriden Rural District Council were before the Committee pleading for permission, as Coventry was going to tear up and use their roads, to take a small portion of the supply that would thus be brought to their doors. Coventry at first resisted; but the Committee were sympathetic with the petitioners. Coventry then yielded, and agreed to concede a supply (up to 10,000 gallons per day) to Meriden on terms.

In addition to the efforts he has been making during the past week in trying to reform the House of Lords, Lord Newton has been giving, with other noble colleagues, very close attention to the Bill the Birkenhead Corporation are promoting for carrying through a monster scheme, whereby Birkenhead will, assuming they are given power, become possessed of a supply of water that will be the envy of other towns of similar rank. They are contemplating taking water from the Rivers Alwen and Brenig, in Denbighshire; the water to run to Birkenhead by gravitation. This is undoubtedly the water scheme of the session; and the pick of the Parliamentary Bar and some of the very brightest stars in the water-engineering firmament are engaged in assisting to pilot the Bill through. If the scheme ripens, the Alwen reservoir will drain an area of 6500 acres, will be 2½ miles long, and will have a capacity of 2100 million gallons. The pipe-line from the reservoir will be 41½ miles long; and from this source, 7 million gallons per day will be secured. The Brenig drains an area of some 5000 acres. The reservoir here will be 2 miles long, contain 1700 million gallons, and yield 5,900,000 gallons a day. There was a third branch to the scheme; but the Committee thought it would be required at so remote a period, that it was cut out. The estimate of Mr. George F. Deacon, the Engineer, for the first instalment, consisting of the Alwen reservoir and one line of pipes, is £758,252; the cost per million gallons of supply per day being £108,322. The Brenig instalment is estimated to cost £576,182, or £82,213 per million gallons. There was a big discussion on many points; but it suffices here to say that the scheme passed through, the only matter directly affecting it being that the compensation water has been raised from one-quarter to one-third of the quantity taken. For bulk supply in out-districts it was also decided that the limit of price to be charged should not be more than 10 per cent. higher than the price in the Corporation's own area. One other Bill dealing in part with water was that of the Sheffield Corporation; and this was before Lord Ludlow's Committee; but the Committee were not troubled for a decision—the opposing millowners and the Rotherham and Doncaster Corporations being satisfied after a little discussion.

In the House of Commons the Leeds Corporation Bill—one of the main objects of which is to alter the position of the Colsterdale reservoirs (one of the reservoirs that was authorized by the Leeds Act of 1901)—has passed the Unopposed Bills Committee. A curious matter was raised by the Newquay Water Bill. The promoters are proposing to construct additional works to meet the requirements of the influx of visitors in summer. If it were not for these visitors, additional works would not be needed; and therefore it is thought by the promoters that they are entitled to proper compensation for this service. Consequently, it was proposed—notwithstanding the closing of boarding-houses for part of the year—that the Company should not be compelled to supply such houses under a specified minimum charge, and for not less than twelve months. The Local Government Board do not approve of this. The Unopposed Bills Committee, however, consider it is very hard on the Company to have to make the special provision without adequate compensation; but they are indisposed to give the Company what they asked for. The matter has been postponed until to-day, to see whether some other fair plan cannot

be evolved. The Penrith District Council Bill has been before the Police and Sanitary Committee; but no material change has been made in either the water or gas section.

The Joint Committee (sitting under the chairmanship of Viscount Cross) who were appointed to consider the Bill of the Metropolitan Water Board have commenced their sittings. They have got so far with their work that it may be imagined they have no difficulty in appreciating the tangle of charges with which the Water Board have now to deal, through the bringing under one administration of so many undertakings, formerly managed by different directorates and under varied circumstances. The Board are now, pursuant to the statutory obligation imposed upon them by their Act of five years ago, asking Parliament to bring the scales of charges in their area to the common level of 5 per cent. on the rateable value. Naturally those who will benefit from this levelling are rejoicing; those who will have to pay more, quite naturally too, are rebellious. Manufacturers especially are offering strong resistance; foreseeing that domestic supply will benefit at their expense. The people of the City, where water is to such large extent only required for personal use during the day, are up in arms against the measure; and the City Corporation are proposing that the storm raised should be quelled by supplying by measure. The proposal of the Bill is a matter of great difficulty; but what else can the Water Board do? Uniformity of charge is an inevitable consequence of concentration of administration in the case of such public supply concerns as water undertakings. Some must suffer; some must benefit.

In view of the Whitsuntide recess, there will be little more done in the Committee rooms this side of June.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 479.)

BUSINESS on the Stock Exchange was very quiet all last week. The public are doing next to nothing in investment lines; the jobbers say they are full up with stock; and brokers complain that when they have orders to sell they sometimes experience unusual difficulty in getting any price at all. So far the cheapening of money does not seem to have done very much good. The opening last week gave a little promise of amendment; for the tone generally seemed improving, and Consols and the gilt-edged division were rather firmer. But the movement was checked back next morning, though towards the close it was inclined to rally. Wednesday continued dull and apathetic. Thursday was almost lifeless altogether, and everything drooped inanimately. Friday opened dull enough; but later on it contrived to shake off some of its depression, and things recovered a little. Saturday was too quiet to effect any marked movement, and, speaking generally, there was next to no change. In the Money Market there was an abundant supply. A little speculation was apparent as to a further lowering of the Bank rate on Thursday—mostly on the part of those people who do their best to talk a rate down—but the Bank Directors saw otherwise. Business in the Gas Market was more animated than it was the week before. The tendency was, however, weaker. A few quotations were put down; while only one undertaking marked a rise. In Gaslight and Coke issues, the ordinary, after having stood remarkably firm for many weeks, began to give way on Monday. The opening bargain was at 95⅜, from which point the figures slowly gave way until on Friday one transaction at 93¾ was marked. But on Saturday 94⅛ was reached more than once. The secured issues were moderately dealt in. The maximum changed hands at from 88 to 88¼, the preference at from 104 to 105, and the debenture at 83½ and 84¼. South Metropolitan was only moderately busy, and was unchanged, with transactions ranging within the limits of 123½ and 124½. The debenture was not dealt in, but the quotation was put down a point—level with that of the other two Metropolitan Companies. In Commercials, the 4 per cent. was firm, marking 109⅛ and 110. Nothing was done in the 3½ per cent.; but the quotation was for some reason or other put down a couple of points. Among the Suburban and Provincial group, Brighton ordinary was done at 162 and 162¾, British at 43½ and 42¾, South Suburban at 121 free, Tottenham "A" at 125, Wandsworth debenture at 79½ and 80, and West Ham debenture at 104½. Of the Continental Gas Companies, Imperial was more active, with transactions ranging from 178⅛ down to 176 (a fall of 1 in the quotation), and ditto debenture marked 94 and 94½. Union marked 119; and European part-paid marked from 18¼ to 18⅛. Tuscan was done at 10⅞ and 10¾. Among the undertakings of the remoter world, Bombay changed hands at from 7 to 7⅛, Buenos Ayres at 11⅞ and 11⅞, Primitiva at 7⅛ and 7¼, ditto preference at 5, ditto debenture at 96½, River Plate at from 12⅞ to 13 3/16, ditto debenture at 95½ and 96, and Melbourne 5 per cent. at 101.

An Imperial College of Science and Technology.—The "London Gazette" recently contained a notice to the effect that a petition had been presented to His Majesty in Privy Council, from the President of the Board of Education (the Right Hon. Reginald M'Kenna), praying for the grant of a Charter for the incorporation of a new institution, under the title of "The Imperial College of Science and Technology;" and that His Majesty had referred it to a Committee of the Lords of the Council.

ELECTRIC LIGHTING MEMORANDA.

London's Release—Parliamentary Interference with the Will of the Ratepayers—Modern Annoyances in Capital Cities—Lighting a Gorgeous Workhouse—Financial Questions at Ipswich—Complimenting the Gas Company.

By the vote which the ratepayers of London gave in March, they have been relieved from the incubus of the multi-million scheme for the electricity supply of London which the Progressive extravagants had designed for the Metropolis and a not inconsiderable part of the surrounding country. The Moderates, who are now masters of the situation, have finally determined that, whatever befalls, the financial responsibility for such a scheme shall not be cast upon the ratepayers. Private enterprise is willing to shoulder the risks; and the Council have agreed that private enterprise, with proper control by the Council, shall have the opportunity—provided Parliament do not, in the eagerness of the majority to serve communistic ideals, wreck the Committee's intentions. The Council's Parliamentary Committee do not think the privately promoted schemes before Parliament are sufficiently comprehensive, in that for one thing, we may suppose, they do not include provision for any controlling power by the Council. Of course, whether the Council's proposals are worthy of continued support depends entirely upon what is meant by "control." If the term covers a payment to the Council which will penalize the consumer through a high price, as in the case of the Paris gas supply until recently, then we should prefer to see the whole proposal quashed at once. But we do not think that is the intention, as it would undermine the whole reason for any new scheme. However, by their vote last Tuesday, the Council decided to let the Bill go to second reading, on the understanding that later it is to be shorn of some of its more mischievous features. Then advantage will be taken of the alternative course provided for, of assigning or transferring the powers to some company or body. As to what is going to be done ultimately has not yet been precisely developed; but this, at present, is a small matter compared with the fixed purpose of the Council not to sink the ratepayers into a depth of responsibility for the provision of electricity for manufacturers and the supply of electricity in bulk to existing electricity undertakings. If manufacturers so much desire electricity, let them (if they are dissatisfied with the existing supplying undertakings) approach Parliament direct, and combine in furnishing the wherewithal to meet their wants. If those who are at present supplying electricity believe that, in some other way than on present lines, they can generate electricity cheaper than they are now doing, then give them the necessary powers for developing what is essential to that end. The alternative is that now proposed by the reformed County Council; anything being better than involving the ratepayers of London in further financial responsibility and an increase of the rates, which, it is admitted, would be inevitable. The newspapers that are directed by those who think and speak Progressively, have been ranting about handing London over to trusts. But there is no use wasting time and space over their partizan invective. The sooner the journalists concerned think more of the ratepayers' interests and a little less of the ambitions in this matter of their party leaders, the better will it be. But, however strong their abuse, it is not sufficiently so to confound those placed in a position of supremacy by the ratepayers. The newspapers referred to are as those crying for help in the wilderness.

The debate on the second reading of the County Council Bill commenced on Thursday night, and was postponed until last night, so that we are unable to record the result in this week's issue. But throughout the debate on Thursday, it was amusing to see how the members of the House who blindly worship municipal trading set themselves to obstruct the decisions of a Council deliberately chosen to defend, in such matters as this one of electricity supply, the interests of the ratepayers, and to stem the squandering of their money. There is little reason for the ratepayers taking the trouble to elect representatives for such purposes if the local government of London is to be transferred from Spring Gardens to St. Stephen's, and the decisions of those representatives are to be ruled out by a Parliament containing an extraordinarily large majority of adherents to the old policy which the ratepayers of London conclusively stamped out between two and three months ago. Some of these adherents to the old policy wanted, in view of the Council's decision, to reject the Bill altogether. From our point of view, there would have been no harm in this course; but the more sober-minded advocates of municipalization saw risk in it, and pleaded for some such middle course as ensuring that the lease of the undertakings should terminate (say) in 1931, and inserting safeguards as to the questions of time, price, and dividends. Others, too, considered it better the powers of supply should go *viâ* Spring Gardens than direct to a private company. The President of the Board of Trade thought so, too, if proper limitations were applied; and he urged that the Bill ought to be allowed to go to a second reading. Whatever Parliament may eventually determine, they cannot compel the County Council to do anything directly contrary to the mandate of the ratepayers. The majority in the present Parliament is going the right way to work to create such chaos in both local government and in private enterprise as has never before been witnessed. The Administrative County of London Company, after their two years' fighting, apparently now recognize the uselessness of proceeding farther, and have withdrawn their Bill.

There ought to be international concord now. Three of the great capitals of the world have recently suffered similarly; and mutual sympathy should surely bring them into still closer union. London in important parts at Christmas time through accidents at electricity works, Paris just recently through a strike, and now —only last Wednesday evening—Berlin, also in important parts, have suffered from the collapse of the supply of electricity. With regard to the latest trouble, an area embracing the magnificent Friedrich and Leipzig Streets was suddenly plunged in darkness, and graphic are the descriptions that reached London of what happened in consequence. The streets and shops were filled with jostling crowds making their purchases for the Feast of the Ascension; and tradesmen who were facing their customers suddenly had their customers blotted from view. Shops, restaurants, and cafés were thronged with people; and something like panic ensued in more than one place. Most of the tradesmen had to close their premises, and so lost the profit that might under more favourable circumstances have accrued. Several of the chief theatres were caught, and at the Opera House the money paid for tickets had to be returned. There was the now common raid on chandlers' shops for candles. These collapses of electricity must bring a rich harvest to the vendors of these humble means of illumination; and they must have learnt to esteem electricity as a friend, though in disguise.

We recollect that, when the lighting of the new workhouse for Hammersmith was under discussion, it was stated that the electric light would be cheaper than incandescent gas lighting. Of course, those statements were made on electrical estimates; and about electrical estimates, the less said the better. But of course, the same thing as to cheapness is always said when the lighting of a public institution is wanted (as we assume is the case in this instance) for the municipal electricity undertaking; it does not matter very much to the promoters how the matter eventually works out, so long as the scheme scrapes through the preliminaries. A Local Government Board inquiry is now being held into the reckless extravagance that the Hammersmith Board of Guardians have been guilty of in the construction of a palatial hotel, replete in every convenience and luxurious appointment, for the favoured persons of the borough who—we were nearly writing fortunately —find themselves barren of the wherewithal to sustain existence. Details respecting this monument to the want of efficiency and economy in local administration are to be found in the Daily Press. Here we have only to point to the unpardonable waste that has been incurred in fitting up this "palace workhouse" for electric lighting. Originally, it was calculated that the large sum of just under £9000 would suffice for wiring and fittings; then the Local Government Board reduced the amount to under £6000; and the actual sum spent has been £7531. In the opinion of the Local Government Board's Electrical Engineer (Mr. H. Ross Hooper), the work could have been efficiently executed for £3400. The Guardians adopted a system of duplicate wiring which, it is stated, was rejected for Buckingham Palace on account of the expense. What is too expensive for Buckingham Palace is not so when the bottomless ratepayers' purse is at the command of a handful of prodigals. The dining-hall is fitted with a dozen electroliers, each carrying five 16-candle power lamps. In the kitchen there are four brass electroliers, bearing five lights each. In the roadway outside the building, the electric standards —standards costing £11 3s. 6d. each—are placed closer together than there is any occasion for, inasmuch as needlework and reading are not roadway occupations at night time. In every nook about the place to which light could be carried, lamps have been placed. Everything is on a lavish scale. Altogether there is the equivalent of 4000 8-candle power lamps in the building, giving an average of five lamps per inmate; and the cost of the electricity per inmate is calculated at from £2 to £2 10s. per annum. Excess on every hand; and this is one of those workhouse electrical schemes that was going to justify its existence by coming out cheaper than incandescent gas lighting! Which of our electrical contemporaries will now offer or attempt to vindicate the Hammersmith Guardians?

There has been a protracted discussion in the Ipswich Town Council on all sorts of matters affecting the electricity undertaking and the tramway department. There seems to be some amount of dissatisfaction regarding the payment made for electricity by the latter to the former; the result of the low price paid being, so it is declared, that the electricity undertaking is made to look undeservedly worse in the eyes of the ratepayers than it really is. Up to the present time, the electricity undertaking has required support from the rates totalling to £5080; and the tramways have claimed support to the amount of £3423. It appears to be quite a reasonable complaint on the part of the friends of the Electricity Department that the tramways are unduly favoured; but there would be little interest in going into the figures here. However, among other things that, in the Council, was charged against the Electricity Department, is that no provision has been made for depreciation. Touching upon these matters, the "East Anglian Daily Times' says that a great deal of nonsense is talked about the two undertakings, and much uninformed criticism is the result. We should not like to say that this also applies to our contemporary; but what we think, after reading the editorial remarks, may be kept to ourselves. The informed writer—or rather the writer who is qualified to refer to other local criticism as uninformed—says that in the past four years the ratepayers have contributed £5080 to the support of the electric lighting undertaking; but the Committee have saved £5466 18s. 11d. towards repayment of principal. So that, argues our illogical friend, the ratepayers are £386 18s. 11d. to the good on the four years! That is really lovely. If the ratepayers had not contributed the £5080, the Committee would not have had £5466 18s. 11d. towards repayment of capital; so that the difference between the £386 and the £5466 18s. 11d.—that is to say, the £5080—is the amount by which the ratepayers are to the bad. Therefore how can they also be £386 to the good?

Then our contemporary says that the sum of £5466 (of which the ratepayers have provided £5080) may be called either a depreciation or a reserve fund, or a fund for capital repayment. The writer of that statement knows little about the history of certain other electricity concerns, and about the rate of the deterioration of electricity plant, or he would not have made himself responsible for such a statement. His argument as to the amount put aside for repayment being the same as depreciation or reserve shows ill-consideration of the economic aspect of the question. Electrical plant rapidly depreciates; and the money spent on maintenance only sustains it for a period—not for ever—in a working condition. The time comes when it is compulsory that the plant shall be replaced, and that time is frequently found to be before the money originally borrowed for it is paid off. But supposing the repayment and life to synchronize, if there has been during the life of the plant no provision from its earnings for replacement, then it means borrowing again, with both repayment and interest attached; whereas provision for renewal during the life of the displaced plant means that continued sinking fund and interest are saved. If the sinking fund is regarded as the equivalent of depreciation, the undertaking will never be in a better position in connection with its capital account, but, on the contrary, will gradually grow worse—certainly it will be worse off than the company-managed concern, with only interest to pay on capital (no repayment being made), and with funds in hand for renewals. During the discussion of the question in the Town Council, some remarks were made about the Gas Company which ought to cause the Directors, and their chief officer and staff, to blush. The Company were described as most efficient, and as suppliers of gas at reasonable rates. Another speaker stated that the Paving and Lighting Committee would be willing to make use of the electric light if they could do so on the same terms as gas; and he calculated that the adoption of the electric light for street lighting would result in the present charge of about £5000 mounting up to £7000 or £8000. The public recognition of this is rather a significant denial of certain statements made in the literature of the Electric Lighting Department as to the cheapest light. We say "significant," because we think that the Department would be prepared to take over the street lighting at a cheaper rate per unit than is charged to private consumers.

PERSONAL.

The Devonport Town Council on Thursday last confirmed the appointment of Mr. H. Clarke, of Luton, as Outdoor Superintendent of the gas undertaking.

Mr. William Angus has been appointed by the Directors of the Buenos Ayres (New) Gas Company, Limited, Gas Engineer to their works in Buenos Ayres, and also Consulting Engineer for the Company's other works in South Barracas and in Bahia Blanca. Mr. Angus, who is 34 years of age, is a native of Aberdeenshire. He served his apprenticeship as mechanical engineer with Messrs. Barry Henry and Co., Limited, of Aberdeen. Subsequently he was for several years employed by this firm as also by Messrs. Drakes Limited, of Halifax, in superintending the erection of various appliances in connection with gas-works installations in England—including the Dewsbury and Brighouse inclined retort-houses. For twelve months he was under Mr. H. Townsend, of Wakefield. In 1901, he was appointed Chief Foreman and Assistant Superintendent at the Nechells Gas-Works, Birmingham; and during last year he was promoted to the position of Works Superintendent of the Birmingham Corporation's largest station at Windsor Street.

That the natural colour of pure water is blue, instead of white, was long ago discovered. The green and yellow tints are said to be due to extraneous substances. Dissolved calcium salts, though apparently giving a greenish tint, due to a fine invisible suspension, have no effect on the colour of the water when precautions are taken to prevent it. The brown or yellow colour due to iron salts is not seen when calcium is present.

Quoting from an article in a contemporary, on wrought-iron work, the "Engineer" points out that if the material is not properly cared for with respect to painting, or is placed under conditions otherwise bad, it may be expected to rust at a rate which corresponds to the loss of $\frac{1}{8}$ inch on each surface in from fifteen to thirty years; but with proper care as to painting, and exclusive of exceptionally bad conditions, it does not appear to waste at any measurable rate. In some instances, upon scraping the paint from girders which had been in use for thirty years, the metallic surface, bright and clean, showing no trace of rust, has been found beneath the original red lead. Of ordinary steelwork the same cannot be said, the common experience being that mild steel is very liable to be attacked by rust.

ILLUMINATING TRUTHS FOR HOUSEHOLDERS. (4)*

THE RELATIVE COST OF GAS AND ELECTRICITY, AND MATTERS AFFECTING IT.

THERE is no more important matter in the competition of electricity and gas than the question of cost. The electrician will, and does, tell the householder that he supplies the cheaper commodity. The gas manager will, and does, deny this. In this article, the householder will have facts and figures put before him which will enable him to ascertain on which side the truth is to be found. This, however, cannot be accomplished without (in fitting place in the article) initiating the consumer into what are to him somewhat mysterious expressions employed by gas managers and electricians in dealing with this question of cost.

The Standard of Illuminating Power.

The standard of illuminating power for lights, no matter the kind, is expressed in "candles"—that is to say, the standard of light is a sperm candle. The standard is described in the Metropolis Gas Act, 1860, as "sperm candles of six to the pound, each burning 120 grains per hour." This is, as to the use of the term "candles," a sufficient explanation to the householder interested in this matter of the comparative value of light obtained for a given figure from gas or electricity.

Flat-Flame Burners and the Popular Incandescent Gas-Burner.

In making their comparisons, electricians frequently take as the basis for gas the indifferent efficiency of the flat-flame gas-burner. This is unfair; and all such calculations householders are asked to discard as useless, just as they are asked, in their own interests, to discard the wasteful flat-flame gas-burners if they are still using any. Just consider for a moment why it is in the householder's interest to do this. A flat-flame burner, new and good of its kind, using 5 cubic feet of gas per hour, will only give the consumer a light of about 10 candles, assuming the standard quality of the gas to be (say) from 15 to 16 candles, as tested in the standard argand burner with all its refinements. Therefore, to get a light of 60 candles in a room with flat-flame burners, it is necessary to use six of such burners, each consuming 5 cubic feet of gas per hour, or 30 cubic feet in all. Now if an ordinary incandescent gas-burner is taken—these burners can be obtained to give 18 to 20 candles per cubic foot of gas (we are not speaking now of the high-power lamps of which there are several makes, for shop, hall, and other lighting, and which will develop up to 30 and more candles per cubic foot of gas consumed)—by using only 3 to 3½ cubic feet of gas per hour, a light from 60 to 70 candles per hour can be obtained, according to the type of burner used. It will thus be seen that, by consuming only one-nine or one-tenth of the quantity of gas that was formerly burned in a room requiring a light of 60 to 70 candle power, the same illuminating value can be obtained. The householder will recognize from this simple explanation what an immense saving is offered to him, through the scientific mode of using gas with a bunsen burner and a mantle, which the genius of Welsbach produced. A case is known by the writer of a dwelling-house where, by the supersession of the flat-flame burners throughout by incandescent gas-burners, the simultaneous adoption of a gas cooking-stove (afterwards well used) made no difference in the annual expenditure for gas. In other words, the saving in gas effected by the incandescent burners, gave (to put the matter plainly) sufficient gas to feed the cooking-stove; and there were the other gains of increased illuminating power and more comfort and cleanliness.

But it is not every room in which a light of 60 to 70 candles is required from an ordinary incandescent gas-burner or from an inverted burner (which gives a splendid downward light for reading, writing, needlework, and other occupations); and for such rooms, there are the small Welsbach-Kern burners, or the bijou inverted burners, with their very moderate consumptions. A room can be fitted with one or a cluster of these inverted bijou burners, each burner consuming approximately 1 cubic foot of gas per hour, and giving a light of 25 candles. Such a cluster of small lights places in the hands of the householder a power of economy. Supposing a small room with three fixed in it. If a light of only 25 candles is required in the room, one burner can be lighted; and the consumption be only about 1 cubic foot per hour. If a light of 50 candles is needed, two burners can be lighted; the consumption of gas being only about 2 cubic feet per hour. If a light of 75 candles is necessary, the three burners can be lighted; and even then the gas consumption will be only about 3 cubic feet. The division of illuminating power and gas consumption by this highly decorative system of lighting is very useful, and is an aid to economy.

Points in Cost Comparisons.

Well now we have seen that, by the consumption of 1 cubic foot of gas in one or other of the several forms of ordinary incandescent gas-burners on the market, a light of 18 to 25 candles can be obtained. In these calculations, we are going to take the lower figure, 18 candles only, as being obtainable per cubic foot of gas consumed; and we do so because Mr. James Swinburne, a gentleman eminent in the electrical world, says it can be obtained; and also because the consumption of 3½ cubic feet of gas will at 18 candles per cubic foot, give us (to be precise) an illuminating power of 63 (say 64) candles. That is a good figure to take as a basis of comparison; seeing that 64 candles is the illuminating power that can be obtained by using four 16-candle carbon filament electric lamps, when new and when the voltage of the electrical current is suitable and uniform. Many electrical authorities—Sir William Preece, Mr. C. C. Paterson, of the National Physical Laboratory, Mr. Lancelot W. Wild, of the Westminster Electrical Testing Laboratory, Messrs. Haworth, Matthewman, and Ogley, of the Liverpool University, and quite a host of other electrical experts, have all shown that although electric lamps may be called 8-candle, 16-candle, or 32-candle, or be otherwise nominally described, the user cannot place any dependence upon getting the specified illuminating powers, owing to want of constancy of the voltage at which the electrical current is supplied. And even when the voltage is regulated, as at the scientific institutions where tests of electric lamps have been made by some of the gentlemen referred to above, the lamps that give their rated efficiency are few and far between. Moreover, as carbon filament electric lamps advance in age, the consumption of electricity increases, and the illuminating power decreases. That is the testimony of scientific men in the electrical world, and not of managers of electricity works with electricity to sell, though even they, at professional conferences, are fain to admit all this, but they do not proclaim it from the housetops to consumers.

Gas is sold in this country at between 2s. and 4s. per 1000 cubic feet for illuminating purposes. There are places where it is lower than 2s.; there are places where it is higher than 4s. But the price of gas depends on many things—among them the cost of getting gas coal and other material delivered on to the gas-works, the capital expenditure that has to be incurred in erecting works and in laying down the distribution plant, the scope for gas consumption, the amount of the rates and taxes that has to be paid, price of labour, and so forth. Comparison cannot be made between any two towns as to the price of gas without taking into account all the individual local circumstances.

A Comparison in Hours at Various Prices.

It has been seen that an incandescent gas-burner giving a light of 64 candles will consume 3½ cubic feet of gas an hour; so that, at whatever the price of gas,

THAT BURNER, GIVING 64-CANDLE POWER, WILL RUN FOR 286 HOURS PER 1000 CUBIC FEET OF GAS.

Now it is generally found that to a householder without knowledge of electrical terms calculations as to electricity are rather confusing; but we will simplify the matter by saying that 1000 watts are equal to 1 unit of electricity. A carbon filament electric lamp—the lamps most commonly employed—according to their condition, and the circumstances under which they are used, will consume anything between 3½ and 5 to 6 watts per candle power per hour. It may be submitted therefore that 4 watts per hour per candle cannot be regarded as an unfair average consumption. Four of these 16-candle power incandescent electric lamps must be used to obtain the equivalent of the 64-candle power incandescent gas-burner. Therefore if we multiply by 4 (watts per candle power per hour) the 64 candles, we find the total consumption of electricity by the four lamps is 256 watts. That is to say, a unit of electricity, in a room where a light of 64-candle power is required (equal to one incandescent gas-burner), will last for only four hours.

It has already been said that the common prices of gas in this country range between 2s. and 4s. per 1000 cubic feet, and that 1000 cubic feet of gas will suffice to give a light of 64-candle power, consumed in an incandescent gas-burner, for 286 hours. Therefore, let us now see how many hours 2s., 2s. 6d., 3s., 3s. 6d., and 4s. (the prices covering the general charges for gas) worth of electricity will last at different prices per unit.

USING CARBON FILAMENT ELECTRIC LAMPS.

2s. *Worth of Electricity, to obtain* 64*-Candle Power,*

At per Unit.	Will last	Cost per Hour.
3d.	32 hours	¾d.
4d.	24 ,,	1d.
5d.	19 ,,	1¼d.
6d.	16 ,,	1½d.

2s. 6d. *Worth of Electricity, to obtain* 64*-Candle Power,*

3d.	40 hours	¾d.
4d.	30 ,,	1d.
5d.	24 ,,	1¼d.
6d.	20 ,,	1½d.

3s. *Worth of Electricity, to obtain* 64*-Candle Power,*

3d.	48 hours	¾d.
4d.	36 ,,	1d.
5d.	29 ,,	1¼d.
6d.	24 ,,	1½d.

[*These articles are being published in leaflet form for distribution among householders generally and shareholders in gas companies. An announcement on the subject appears on p. 479.]

3s. 6d. *Worth of Electricity, to obtain* 64*-Candle Power,*

At per Unit.	Will last	Cost per Hour.
3d.	56 hours	¾d.
4d.	42 ,,	1d.
5d.	34 ,,	1¼d.
6d.	28 ,,	1½d.

4s. *Worth of Electricity, to obtain* 64*-Candle Power,*

3d.	64 hours	¾d.
4d.	48 ,,	1d.
5d.	38 ,,	1¼d.
6d.	32 ,,	1½d.

AS COMPARED WITH 64-CANDLE POWER FOR 286 HOURS USING 1000 CUBIC FEET OF GAS, AT ANY PRICE, IN AN ORDINARY INCANDESCENT GAS-BURNER.

It will be seen that the cost per hour for obtaining 64-candle power by electric carbon filament lamps works out to: At 3d. per unit, ¾d. per hour; at 4d. per unit, 1d. per hour; at 5d. per unit, 1¼d. per hour; and at 6d. per unit, 1½d. per hour.

With Gas at **2s.**, *used in Ordinary Incandescent Burners.*

	Cubic Feet of Gas.	Will Maintain for One Hour		Total Candle Power per Hour.
¾d. will purchase	31½	9	64-c.p. Burners	576
1d. ,,	42	12	,,	768
1¼d. ,,	52½	15	,,	960
1½d. ,,	63	18	,,	1152

With Gas at **2s. 6d.**, *used in Ordinary Incandescent Burners.*

¾d. will purchase	25	7	64-c.p. Burners	448
1d. ,,	33	9	,,	576
1¼d. ,,	41	11	,,	704
1½d. ,,	49	14	,,	896

With Gas at **3s.**, *used in Ordinary Incandescent Burners.*

¾d. will purchase	21	6	64-c.p. Burners	384
1d. ,,	28	8	,,	512
1¼d. ,,	35	10	,,	640
1½d. ,,	42	12	,,	768

With Gas at **3s. 6d.**, *used in Ordinary Incandescent Burners.*

¾d. will purchase	18	5	64-c.p. Burners	320
1d. ,,	24	7	,,	448
1¼d. ,,	30	9	,,	576
1½d. ,,	36	10	,,	640

With Gas at **4s.**, *used in Ordinary Incandescent Burners.*

¾d. will purchase	16	4	64-c.p. Burners	256
1d. ,,	21	6	,,	384
1¼d. ,,	26	7	,,	448
1½d. ,,	31	9	,,	576

THE NUMBER OF GAS-BURNERS IN THE FOREGOING TABLES MAY BE TAKEN AS THE NUMBER OF HOURS THAT A 64-CANDLE POWER INCANDESCENT GAS-BURNER WILL RUN FOR THE COST INCURRED IN ONE HOUR BY USING FOUR 16-CANDLE INCANDESCENT ELECTRIC LAMPS.

Anyone who critically examines these figures will find slight variations, occasioned by the desire to keep well within the mark as to the quantity of gas ¾d., 1d., 1¼d., and 1½d. will buy, and by the desire not to take credit for more burners than the gas will fairly supply on the basis adopted in this article.

Is it necessary to point the lessons of these figures? They are perfectly clear. It is found that there is a great excess in favour of gas over electricity in the hours of illumination that a given expenditure will provide. We see the great excess of illuminating power that gas will afford over electricity for a given expenditure per hour. We see, too, the great excess in the points of illumination that gas will afford over electricity for a given expenditure. Whereas with electric carbon filament lamps, one can only for an expenditure of (according to price per unit) ¾d., 1d., 1¼d., or 1½d. per hour get four points of lighting of 16-candle power each, the householder will have ascertained from the foregoing tables the great addition to the points of lighting—64-candle power points be it marked, and not 16-candle ones—that he can secure by using the much more economical method of illumination by incandescent gas-lamps, and the points can be further increased by using burners consuming a smaller quantity of gas, but giving a proportionate illuminating power (in some cases more) per cubic foot of gas consumed. Of course, it must be borne in mind that, though a house may have fixed (say) 20 incandescent gas-burners, only a few will be in use at the same time; and from the foregoing tables calculations can be made as to the cost of gas for lighting by every consumer who knows approximately what his requirements are. However the figures are examined, it must be conceded that gas used in the incandescent gas-burner is the more economical lighting agent.

Professor Silvanus Thompson, at the British Association meeting in 1906, presented the following figures showing the relative candle-hours obtainable by ordinary forms of incandescent gas and electric lighting:—

	Candle-Hours for 2s.
Welsbach gas mantle	12,500
Glow electric lamp	3,745
Osmium electric lamp	7,143
Nernst electric lamp	5,882

High Efficiency Electric Lamps.

But the electrical people have more economical lamps—that is, more economical in the consumption of electricity per candle power—than the carbon filament lamp; but these higher efficiency lamps are not useful for all positions, or for use on all electrical circuits. They are more expensive in first cost; and most of them, on account of the extremely low voltage at which they will work, have to be used in series (in groups, and not singly), or their life will be speedily terminated. So that, although with these lamps less electricity is used per candle power, there is no direct saving to the consumer in electricity, in addition to which he pays more for the lamps, of which he is also compelled to use more if he generally adopts them. The advantage he gets for his increased expenditure is an increase in illuminating power. Even then these lamps fall far short of the economy of the incandescent gas-lamp. The lamps here referred to are generally called and classed as metallic filament lamps.

Among these higher efficiency lamps, there is the ½-ampere and the ⅓-ampere Nernst lamps. There are also the Tantalum lamps. Others are still more economical in electricity per candle power, coming down to between 1 and 2 watts per candle power; but the electrical voltages for which they can at present be made are so low that they are not practicable for general use in this country, where electricity is commonly supplied at from 200 to 220 volts; there being very few electrical systems where the voltage has been kept down to (say) 110. The illuminating power of the Nernst lamps, like the carbon filament lamp, decreases considerably with life. A ½-ampere Nernst will give, when new, a photometrical value of 17 candles, and consumes, when new, close upon 50 watts per hour. So that one lamp, giving only 17 candles, will absorb a unit of electricity in 20 hours. This is very little better than the 16-candle carbon filament lamp, which will use a unit of electricity in 16 hours. If a light of 68 candles is required in a room, a unit of electricity will be absorbed by the four ½-ampere Nernst lamp in five hours. A ½-ampere Nernst lamp will give, on photometrical test, 40-candle power, and consume 85 watts per hour. So that a unit of electricity, using one ½-ampere lamp only, will be expended in less than twelve hours, which twelve must be divided by the number of lamps used. Taking a Tantalum lamp, giving photometrically 19 to 20 candle power, and using 38 watts per hour, it will absorb a unit of electricity in 26 hours. But these lamps are not suitable for all electrical circuits unless run two in series; so that consumers, under such circumstances, are compelled to use, to put the matter plainly, the lamps in pairs. Therefore if two pairs of lamps are used, giving 80 candle power in all, a unit of electricity is absorbed in 6½ hours. Compare these consumptions with gas. An inverted gas-burner giving 25-candle power can be run for nearly 100 hours on 100 cubic feet of gas; an ordinary incandescent gas-burner, giving 64-candle power, can be run for 28 hours on 100 cubic feet. This shows that even these higher efficiency electric lamps are a long way behind incandescent gas-burners in economy.

Sir William Preece, the great electrical expert, writes regarding Nernst lamps: "They are somewhat deficient in reliability and durability, and are sensitive to changes in voltage." Similar complaints are constant among electricians. The breakages account cannot be neglected; the saving is much less in their use than is represented by the saving of electricity, on account of the frequent and expensive renewal of the glowers and iron resistances. Not many householders perhaps will understand what is meant by the "glowers" and the "resistances;" but they will not be long finding out on making acquaintance with the lamps. The Nernst lamp, too, must not be used with pressures of under 200 volts; while the Tantalum lamps must never be used on alternating currents. The latter lamps cost from 2s. 9d. to 3s. 6d. each; so that, if two have to be fixed in series for the higher voltages, this means that it will cost for renewing at each point from 5s. 6d. to 7s. Therefore, as we have said, while a greater illuminating power is obtained from each point of lighting, the consumer does not effect any pocket saving for electricity. It will be seen that there is much the householder ought to know concerning electric lamps, so as not to be tempted by plausible statements. The householder ought also to be reminded, before he commits his house and family to electric lighting, that the Electric Lighting Acts make no provision for "moral and intellectual damages."

Renewals.

The electrician makes a great deal of fuss about the renewal of the mantles of incandescent gas-burners; but verily "people who live in glass houses should not throw stones." By occasionally—not frequently—removing the mantle of an incandescent gas-burner, and blowing the dust from the top of the burner, the original illuminating power given by the mantle is restored. Taking the incandescent burners throughout a house, the mantles very rarely require renewal during the summer; and in the winter, only when fractured. So long as they are not fractured, so long a high illuminating power can be obtained from them by periodical attention to the burners. On an average, each well-used burner in a

house will not require more than three or four mantles a year, costing in all (say) from 1s. to 1s. 6d.—that is in a house where there is not rough usage of the mantles; and it must be remembered that these are burners giving about 64-candle power each. With well-used inverted gas-burners, it is found that the mantles have on an average quite a long life. The writer has had them in use for many months without renewal.

What about the renewal of electric lamps? Mr. S. E. Fedden, the Chief Electrical Engineer of the Sheffield Corporation, has published figures which show that a fair average renewal for electric lamps would be three a year; and these are for low candle-power lamps—say of 16-candle power. There are with incandescent electric lamps no means of restoring illuminating power as with a mantled gas-burner. The whole lamp must go when its light begins to diminish and the consumption of electricity has begun to get abnormal. Prices of 1s. 1d. and 1s. 2d. each for respectable types of carbon filament electric lamps have to be paid; and so each point of lighting, renewing the carbon filament lamp three times a year as advocated by Mr. Fedden at 1s. 2d. each renewal, would cost 3s. 6d. Multiply this by the number of lamps distributed through a house, and see whether it does not put the renewal cost of the mantles of incandescent gas-burners well into the shade.

The prescription for electric lamp renewals issued by the Ediswan Company is as follows: Lamps installed in January, should be changed in June; installed in February, changed in August; installed in March, changed in September; installed in April, changed in October; installed in May, changed in November; installed in June, changed in November; installed in July, changed in December; installed in August, changed in December; installed in September, changed in January; installed in November, changed in February; installed in December, changed in April. This prescription practically confirms the advice given by Mr. Fedden; so that it cannot be said an unfair view is taken here of the cost of the renewals of electric lamps.

The reason this frequent renewal is counselled is that, owing to the deterioration of electric lamps, the illuminating power diminishes and the consumption of electricity rises—and rises much beyond the 4 watts per candle taken in our calculations.

Professor Ayrton has said (at a meeting of the Institution of Electrical Engineers) that the cost of electric lamps is of minor importance compared with the consumers' expenditure of energy. That is quite true; but the householder who thoroughly looks into the question of expense will consider that the cost of lamps and renewals (even without reference to the expense of electricity) is not exactly a negligible quantity.

Inaccurate Electricity Meters.

The question of the accurate registration of electricity used by consumers is also one of great importance to them. But the makers of electricity meters do not yet appear to have attained the art of making meters of such accuracy that they can be relied upon. According to the last annual returns issued by the London County Council, their officers tested in the twelve months 2396 new electricity meters, of which only 1226 (or 51 per cent.) could be passed as accurate at the first testing; 410 (or 17 per cent.) were passed as accurate after adjustment and further testing; and 760 (or 32 per cent.) were rejected as inaccurate.

In one of his annual reports the Lighting Inspector of Liverpool stated: In the course of the year, 4654 meters were tested for the Gas Company, of which only 105 were rejected as inaccurate (2·2 per cent.); 2981 electricity meters were tested, and no fewer than 1089 rejected as inaccurate, or 36½ per cent. These figures show the greater perfection and precision of gas-meters.

In the City of London Court in November, 1906, the City of London Electric Lighting Company sought to recover from a Mr. Melling £2 19s. 9d. for electrical energy supplied. The plaintiffs admitted that the meter with which the Company had furnished defendant *registered current when electricity was not being used.* The trouble between defendant and the Company, before it was found out that the meter had been registering current without just cause or reason, arose over the latter sending him an account for four times more current than usual for the period of the year. Then when the meter was sent to be tested, its unreasonable action was discovered; and the Company reduced their claim. The amount named the defendant had to pay, although his meter was of such a lively disposition that it would not stop. Defendant, astonished at the decision, inquired, "Supposing I am charged for 1000 units more than I have consumed, must I pay?" "Yes," suavely said his Honour, Judge Lumley Smith, "if the meter says so."

The General Electric Lighting Acts make no provision for the examination and certification of meters, such as the Sales of Gas Act, 1859, provides in the case of gas. The electricity consumer has, in fact, no reliable protection.

Found Wanting.

Not only are electric lamps vacillating in the performance of duty, but their costs are high, their renewals expensive, the electricity consumer can have little faith in the correctness of the registration of the electricity consumed, and there is also to be considered the question of the unreliability of the supply. Small wonder then that gas undertakings so frequently have to record in their books the return of customers who have tried electric lighting, and have found it wanting, who, in other words, have discovered that practical experience does not come up to prior representation.

ANOTHER IMPERTINENT INQUIRY-CIRCULAR.

Our correspondence yesterday morning was heavy with legitimate and reasonable protests from many parts of the country against an application for replies to a list of nine questions that Mr. Ernest A. Borg, "C.E.," "Mem. San. Inst.," has manifestly sent broadcast among gas engineers and managers. It must not be thought that it is in any satirical vein that we quote the appendages to the inquirer's patronymic. He at any rate attaches great importance to the letters "C.E." They appear on the stamp with which he endorses these letters for information, and they are printed on his letter-paper. We fail to find, from the last published list, that this gentleman is in any way identified with the Institution of Civil Engineers; but we have not troubled to consult the list of the members of the Sanitary Institute to see whether his name is there, as membership of that body is not much of a professional distinction. Mr. Borg, however, holds the important office of Borough Surveyor of Margate; but we are not quite sure whether answers to his questions are required for the Corporation or for his own personal use. The letter covering the list of questions does not help us to a decision on the point. It rather suggests personal use.

As all our professional readers may not have been favoured by Mr. Borg with a copy of the letter and the list of questions, it may be of interest to reproduce them; and certainly they should be placed on record as an example of the sort that is not countenanced by, or desired in, the gas industry.

Margate Corporation, Borough Surveyor's Department,
May 9th, 1907.

Dear Sir,—Being somewhat closely interested in the manufacture of coal gas, I should esteem it a personal favour if you would kindly answer the questions on the enclosed sheet.

Thanking you in anticipation; and trusting that I shall be able, at some time, to reciprocate—I am, yours faithfully,

Ernest A. Borg, C.E.

[Enclosure.]

1. Name of town. 2. Do you use lime or oxide of iron for purification? 3. What is the cost of purification per million cubic feet of gas, using—(*a*) Lime. (*b*) Oxide of iron. 4. Which do you consider the most suitable material for purification? 5. What is the cost of carbonizing per million cubic feet or per ton of coal? 6. Assuming that you have sulphate of ammonia works, to what height is the chimney carried up? 7. Have you inclined, as well as horizontal retorts; and, if so, which system do you consider best for works situated in the centre of a town? Also, which system do you consider best for all purposes—horizontal or inclined? Have you any objection to inclined retorts? 8. Have you any special method of dealing with the smoke which rises while the retorts are being drawn? 9. What coal do you usually use?

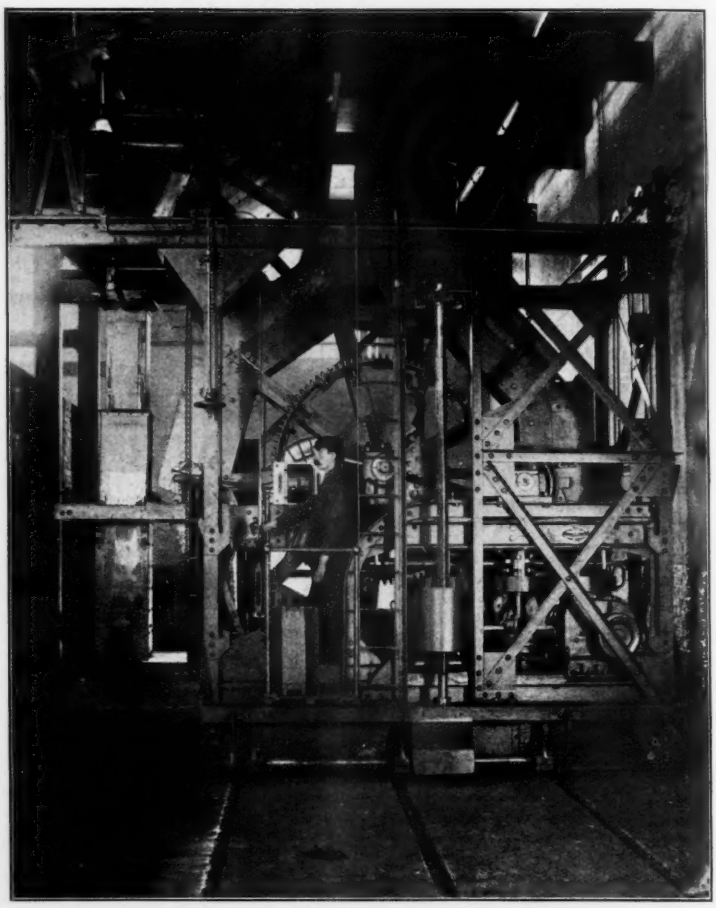
If these inquiries have been sent out on behalf of the Margate Corporation, or by Mr. Borg for his personal gratification and use, the one or the other or both have very much mistaken the gas profession of this country. It will look to gas engineers and managers, as it looks to us, very much like an attempt to build up, "on the cheap," a case of some kind against the Margate Gas Company, and such a case as Mr. Borg may be hoping will bring lustre upon himself. We may be mistaken in this assumption; but if the assumption is correct, it is not too soon to predict that Mr. Borg is doomed to disappointment, and that his Corporation will have to construct their case, if case they want, in the ordinary way—by paying, and paying well, for professional advice. The questions themselves are sufficient to justify the belief that they are the precursors of some sort of attack on the local Gas Company. The questions as to purification reminds us that the Company are not of the dozen or so gas undertakings that are, under antiquated legislation, still compelled to use lime for the removal of sulphur compounds other than sulphuretted hydrogen. The reference as to "works situated in the centre of the town" also calls to mind the fact that those of the Margate Gas Company are not on the outskirts of the town. And the inquiry as to horizontal and inclined retorts brings to memory the fact that the latest extension of the carbonizing plant at the Margate Gas-Works was on the inclined retort system.

Mr. Borg and his employers will be pleased no doubt to have a few testimonials from some of the letters we have received from gas engineers concerning the character of this particular inquiry-circular. One writer describes the letter and inquiries as constituting an illustration of "colossal impudence." Another correspondent, in surprised tone, asks, "Did you ever see the like?" A further writer declares it is "one of the nastiest things I have ever seen done behind a man's back." An engineer more modestly characterizes the questions as "quite unique;" and a further writer is of opinion that the letter and inquiries deserve a place at the very end of the length to which the question plague can go. In all the letters, annoyance is expressed.

We entertain the opinion that the Margate Corporation and Mr. Borg, C.E., Mem. San. Inst., have made their first and last attempt to extract, by this particular method, information from the gas profession which the one or the other or both have an idea will be useful to them. Our only hope is that no member of the gas profession has sent any communication to Mr. Borg other than the brief one deserved. It also strikes us the Corporation may, if they desire now to consult a gas engineer, have some difficulty in finding one who will care to play second fiddle to an inquiry-circular—and such an inquiry-circular!

THE FIDDES-ALDRIDGE MACHINE-STOKER AT THE ECCLES STREET GAS-WORKS, LIVERPOOL.

In view of the meeting on Saturday of the members of the Yorkshire and Manchester District Junior Gas Associations, when (as reported elsewhere in to-day's issue) a visit was paid to the Eccles Street Gas-Works of the Liverpool United Gaslight Company, Mr. Edward Allen, M.Inst.C.E., their Engineer, prepared some notes on the installation there inspected of the Fiddes-Aldridge machine-stoker, and the conditions of working to which it is subjected. From these it is interesting to learn that it was the experience of twelve months at their Wavertree works that induced the Directors of the Company to adopt the Fiddes-Aldridge machine at Eccles Street—particularly as the conditions there were more favourable to cheap and efficient working.

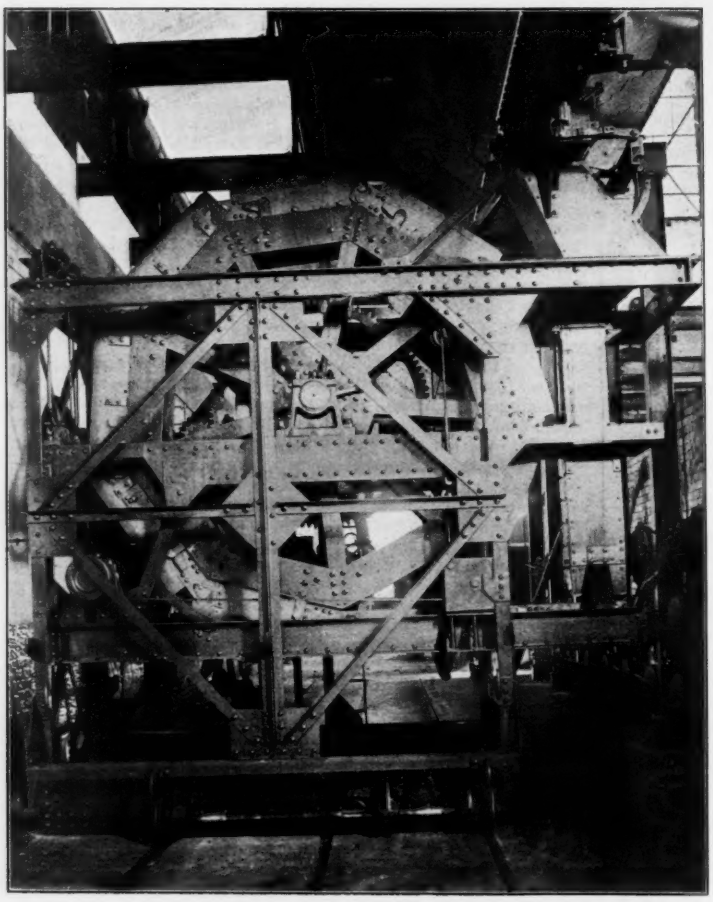


There are at Eccles Street two retort-houses, forming one building; and in one of them there has been a bench that occupied one-half of the house, containing eight beds of sixes on Gibbons's regenerative system. The other half was used as a stores for fire-brick goods, &c. The adjoining house had been fully occupied by four benches of direct-fired retorts, which were only at work during midwinter, and had come to the end of useful life.

The old benches were cleared out early in 1905; but the chimney, which was in the centre of the house, and in good condition, was left standing. A bench of eight beds of sixes, with regenerator settings, was built in the west half—the end nearest to the coal hoppers. It was placed out of centre, so as to allow ample space for the machine on one side; while sufficient room was left for handling the discharged coke, and attending to the producers on the other. Ascension pipes and hydraulic main were provided on the discharging side only.

Coal and cannel are brought in barges on the Leeds and Liverpool Canal. The material is taken out of the boats by a grab suspended from a jib-crane, and delivered into elevated hoppers, passing on its way through an Ingrey patent automatic weighing and recording machine.

For the hand-charged retorts, the coal is drawn off by bottom doors; but for the new benches it is guided by a shoot into a breaker, and from thence is elevated and conveyed direct into the over-head hoppers, from which the Fiddes-Aldridge machine takes its supply.



Since last October this bench has been constantly at work, and has given great satisfaction. The cost of carbonizing has been reduced considerably below that at the Wavertree works, in consequence of more favourable conditions. The weight and duration of the charges have been varied, with, of course, a variation in the cost. The maximum weight of the charge was 8 cwt., and its duration was six hours. The material used was finely broken coal, without admixture of cannel; but as the measuring chamber on the machine was limited to 7¼ cwt., it was not convenient to continue this method of working.

Better results, however, were obtained from four-hour charges of 6 cwt., all coal—thus enabling each retort to carbonize 36 cwt. per day, or 86 tons 8 cwt. by the bench, at a cost of 11·4d. per ton. This includes all wages paid to the three machine men, one power-house man, three lidmen, six coke-wheelers, three furnace-men, and one hopper-man. These men deal entirely with the operations from the coal shoot to the coke bank.

At that time the bench in the other house carbonized all cannel. But when it was dropped and cannel had to be mixed with coal in the machine, it was found necessary to reduce the charge to 5½ cwt. and 4 hours 48 minutes (or five charges per day); the cost being nearly 15d. per ton.

As far as the great majority of gas-works are concerned, the use of cannel need not be considered; and, therefore, for an installation of 48 retorts 11·4d. may be taken as the cost of wages per ton under the above conditions. The figure could, however, be further reduced if the power-house man were dispensed with, or if two instead of three shifts of men were employed. Again, it may be possible to carbonize a heavier charge of fine coal—say, 8 cwt.—and thus reduce the cost per ton.

So far, we have dealt with one bench; but since January last another has been in course of construction which when in commission will give better results. Thus, with the two benches at work on the basis of four-hour charges of 6 cwt. each, and

employing three machine men, one power-house man, three lid-men, twelve coke-wheelers, six furnace-men, and two hopper-men, the cost would work out at 9d. per ton.

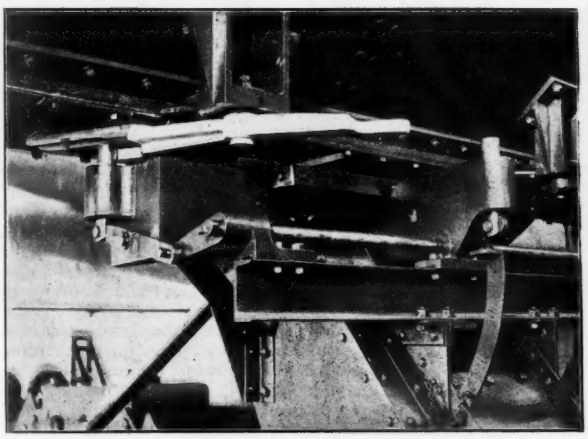
The New Fiddes-Aldridge Machine.

The portion of the machine which is responsible for the charging and discharging of the retorts simultaneously consists of a series of parallel plates held in a vertical position by means of flat-iron stays—curved or arched to suit the crown of the retort, and firmly secured at each end to the plates. These plates are joined to each other by a kind of hinged joint—thus forming a "chain," as it is called, which can be wound on a large vertical wheel. At intervals along the length of the chain, push-plates are suspended from the arched stays previously mentioned. They are free to lift in one direction, but cannot go beyond the vertical position, when the chain is entering the retort—being prevented from so doing by projections on the side plates.

It will be readily seen that these push-plates will push the coal along the floor of the retort in the forward direction, but when reversed will automatically lift and pass over the top of the coal, thus helping to spread it evenly in the retort. The construction of the "chain" differs in a few important particulars from the "chain" used on the Wavertree machine.* The side plates are deeper, and the push-plates are hung from the highest possible point—*i.e.*, an arched stay—thus enabling a much heavier charge to be dealt with than formerly. In the Wavertree machine, the amount of the charge was limited by the height of the bolts on which the push-plates were pivoted.

The front push-plate is larger and heavier than the other push-plates, and is used for pushing the coke from the retort. In other respects, its action is similar to the others.

The front links or side plates immediately behind the front push-plate have been improved, and now have the effect of spreading the charge evenly up to the sides of the retort. This is brought about by means of a small "wing" or "plough" and an opening at each side; so that, as the chain is being withdrawn from the



The New Gear for Automatically Operating the Overhead Hopper Doors.

retort, the two ploughs throw some of the coal, through the openings in the chain, against the sides of the retort. Before this improvement of the machine was introduced, the charge of coal was not laid right up to the sides of the retort—a space of an inch or so being left.

The chain and the large wheel on which it is wound are the essential parts of the machine. The other portions are for the purpose of feeding the coal, and moving the machine to suit the various positions of the retorts.

The outer frame is mounted on four travelling wheels, and carries six lifting pulleys (four at the back and two at the front), from which is suspended the inner frame of the machine. The outer frame also carries part of the travelling gear, the measuring chamber, the shoot, and the gear for operating the overhead hopper doors.

The latter is a new arrangement, whereby the exact amount of coal required for one charge is taken automatically by the machine while it is travelling from one retort to the next, without any special attention on the part of the driver. Means are provided for rendering this gear inoperative when it is desired to pass along the floor of the house without taking any charges. The measuring chamber is provided with a hinged plate inside for reducing the capacity; so that the charge may be adjusted and fixed to any amount between 5 cwt. and 7¼ cwt. A sliding door is fixed at the base of the measuring chamber which is operated by the driver by means of a chain and chain-wheel.

The front portion of the outer frame of the machine has been brought farther away from the bench than in previous installations, giving more room for the lidsmen to open the mouthpiece lids, and enabling the driver to obtain a better view of the chain entering the retort. This improvement also has reduced the weight of the machine considerably, and has rendered its appearance lighter.

The inner frame is suspended inside the outer frame by four steel ropes, and is capable of being raised or lowered to the different levels of the retorts. It carries the chain, the chain-wheel, the guides, the apron plate, and the lower portion of the telescopic shoot on the one side; while the driver's platform, the motor and controller, and the gear for the charging, lifting, and travelling motions are on the other side. An improvement has been made in the driver's platform, which in this case extends outside the outer frame of the machine—a gap in the outer frame being formed so that the operator may step on to the platform and enter the machine at any level. In the Wavertree machine the driver was enclosed inside the outer frame, which was very inconvenient.

The telescopic shoot has also been improved, and now delivers the coal directly in the centre of the chain; adjusting plates being fixed inside, near the mouth, to regulate the flow of the coal.

The machine is driven by means of a Siemens enclosed type motor, 13½ B.H.P. at 220 volts and 480 revolutions per minute. It is fitted with a solenoid brake, and is worked by a tramway type controller. The current is obtained from overhead wires by means of collectors fixed to the outer frame of the machine and conveyed to the motor by means of a flexible cable.

The power of the motor is transmitted by means of a worm and worm-wheel to a vertical shaft, and thence (1) by bevel and spur wheels to the chain wheel for the charging and discharging, (2) by spur and worm wheels to a shaft on which four barrels are keyed for winding the steel lifting ropes, (3) by spur, worm, and mitre wheels to the two shafts on which the travelling wheels are keyed. These three motions are each fitted with a sliding claw clutch, thrown in or out of gear by means of a lever near the driver's platform. Thus the driver on the platform has control over all the operations of feeding, charging, discharging, lifting, lowering, and travelling.

All the gear wheels and the travelling wheels are made of cast steel, with the exception of the worm wheels, which are made of phosphor-bronze. The large spur wheel which is fixed up to the chain wheel has in this case been made in a number of segments, easy to replace should a breakage occur.

The machine runs on a pair of tram rails laid on a solid concrete foundation. In planning the installation it was arranged that the cellar on the charging side of the bench should be only 6 feet wide (sufficient for access to the dampers), in order that the tram rails might have a foundation on the solid ground. At Wavertree the rails were laid on a "concrete with expanded metal" floor, which spanned the cellar; but this was found so unsatisfactory that a wall has been built to carry one rail and the floor under the other has been greatly stiffened.

The whole of the coal-handling machinery is driven electrically in a similar way to that at the Wavertree works. The electrical plant was supplied by the Electric Construction Company, and the National Gas-Engine Company provided a 50 B.H.P. gas-engine. This power will also be used shortly for driving a gravity bucket conveyor to be fixed in the purifying house for elevating and conveying oxide.

* Described in the paper read last year by Mr. Allen before the Institution of Gas Engineers. See "Journal," June 26, 1906, p. 900.

ASSOCIATION OF WATER ENGINEERS.

Programme for the Annual Meeting.

We learn from a circular issued by the Secretary of the Association (Mr. Percy Griffith, M.Inst.C.E., F.G.S.) that the Twelfth Annual General Meeting will be held at Windsor from the 6th to the 8th of June, under the presidency of Mr. Christopher Sainty, M.I.Mech.E., the Water Engineer to the Corporation. The following papers have been promised for reading and discussion:—

"The Detection of Pollution in Underground Waters, and Methods of Tracing the Source Thereof." By Dr. J. C. Thresh, County Medical Officer, Essex.

"High-Pressure Centrifugal Pumps." By Mr. Robert C. J. Dicken, M.I.Mech.E.

"New Water-Works at Milton-next-Sittingbourne." By Messrs. William Gore and Martin Deacon, Assoc.MM.Inst.C.E.

"The Scunthorpe Water-Works." By Mr. Alexander M. Cobban, Water Engineer.

On Thursday afternoon, a visit will be paid to the Staines reservoirs, which will be inspected under the personal guidance of Mr. W. B. Bryan, M.Inst.C.E., the Chief Engineer of the Metropolitan Water Board, and Mr. R. E. Middleton, M.Inst.C.E. (one of the Joint Engineers for the works), who has prepared a description of them which will be supplied to members taking part in the visit. The annual dinner of the Association will be held in the Guildhall in the evening, when Mr. J. F. Mason, M.P. for Windsor, the Mayor, and other members of the Corporation are expected to attend. On Friday afternoon, visits will be paid to Windsor Castle, Eton College, and the Corporation Water-Works, Tangier Island, where tea will be provided by the President and Mrs. Sainty. (A description of the works will, it is expected, be circulated at the meeting.) In the evening, a concert will be given in the Victoria Hall of the White Hart Hotel. On Saturday afternoon, arrangements will be made for a drive to the Royal Gardens at Frogmore.

In connection with the meeting, it has been arranged to have an excursion to Paris, to inspect the water-works, &c.

LOADING AND CONVEYING PLANTS FOR USE IN GAS-WORKS.

By G. Dieterich,

Engineer-in-Chief to Adolf Bleichert and Co., of Leipzig-Gohlis.

(*Concluded from p.* 375.)

After having drawn attention to the essential characteristics in this new transport system of electric suspension railways, I must now pass on to its employment, although, from a natural regard for space, I have had no opportunity of going more closely into those technical details which are equally worthy of attention. I have already remarked that rope-driven suspension railways are more or less restricted to direct lines. The electric suspension railway, on the other hand, is absolutely independent of location, and has the most important advantage that it can take any given curve. The consequence is that the ground plan of a transport plant on this system shows a very different appearance to that of plants on the ordinary mechanical system, as every angle and corner of the ground can be utilized to an extent hitherto almost unknown. The system of electric suspension railways exercises not only an influence on the development of the ground plan, but perhaps to an even greater extent on the overhead development of transport plants. As we have already seen, the electric suspension railway is not only capable of handling the horizontal traffic, but also the vertical, and serves at certain points as a full substitute for cranes, which were previously an absolute necessity. This makes itself advantageously noticeable at the unloading points of vessels and railway trucks.

I will now give several characteristic examples of electric suspension railway plants in gas-works, as a completion of my article.

Coal Transport Plant for the Schiedam Gas-Works.

This coal transport plant was carried out by the firm of Carl Francke, of Bremen (Bleichert's electric suspension railway being employed), and serves to convey unbroken coal arriving in barges to the storage sheds. As can be seen from figs. 36 to 38 (*ante*, pp. 373-4), the plant is typical of the adaptability of this new means of transport to already existing buildings. It is particularly remarkable that, although the coal is not broken, it is nevertheless hoisted by a cup-elevator. The coal then falls into a bunker, whence it is drawn off into suspension railway cars.

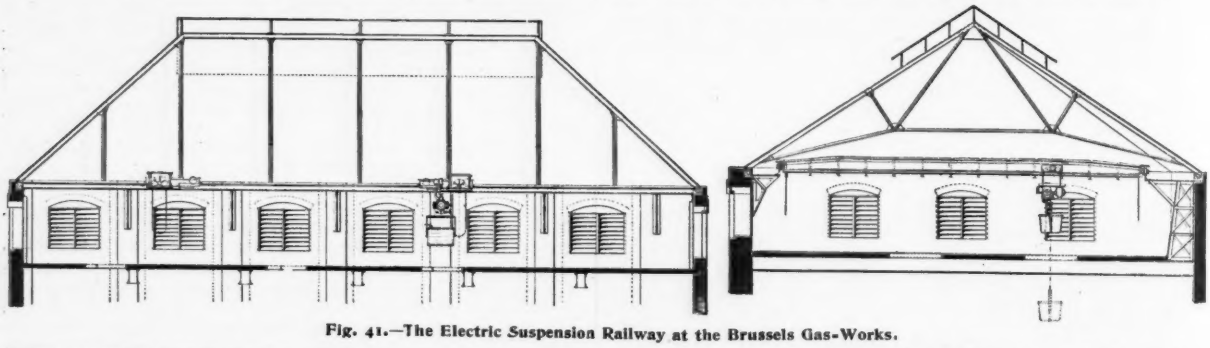
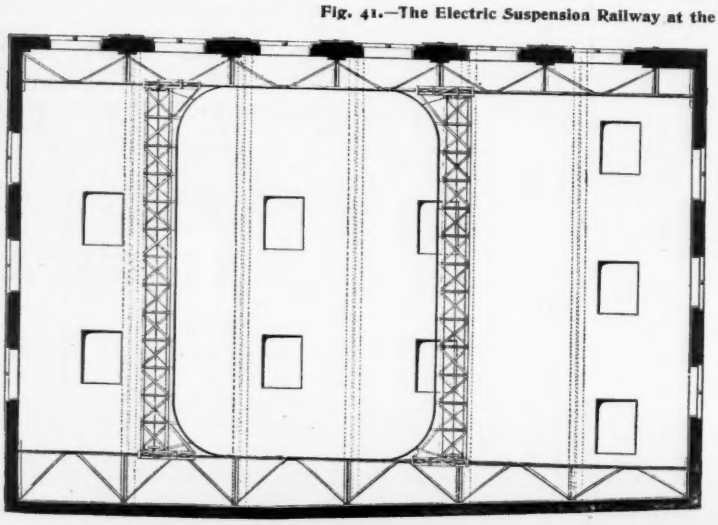


Fig. 41.—The Electric Suspension Railway at the Brussels Gas-Works.



The man attending to the plant puts the car in motion by simply switching, and it then runs without supervision to the coal-sheds. Here it strikes on an easily moveable bar, empties automatically, and, moving round a loop, returns to the loading stage for refilling. On the loading station is also an automatic weighing machine, which automatically registers the weight of the load of coal as the car runs over it. The attendance on the plant is reduced to a minimum—one man on the loading platform and two in the vessel for controlling the elevator and coal shovelling. In this plant, built for an hourly capacity of 15 tons, one ton of coal weighed and stacked costs about 1d. in wages and consumes 0·3 kilowatt per hour. It must also be remembered that the coal is shovelled by hand, so that no automatic filling appliance exists.

Electric Suspension Railway for the Conveyance of Purifying Material for the Municipal Gas-Works, Brussels (St. Josse-ten-Noode).

This plant, shown in figs. 41 and 42, serves to spread the material taken from the purifiers over

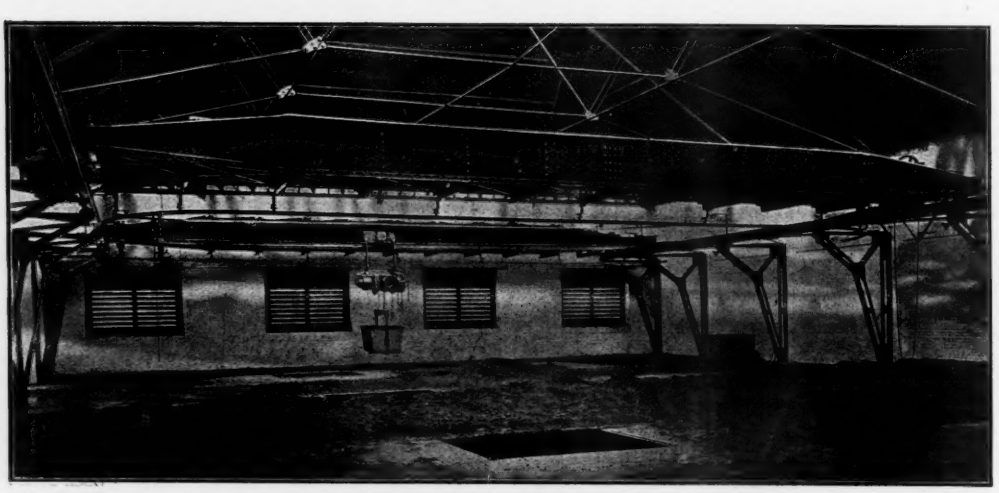


Fig. 42.—The Interior of the Brussels Purifier House.

the revivifying floors, take it up again, and return it to the purifiers. The plant is so arranged that the purifying room lies under the revivifying floors. Above each of the purifiers is a trap door towards the floor, through which the material can be brought up. A suspension railway track runs on each side of the revivifying floor underneath the roof; and these tracks are connected by light moveable girders, which carry one suspension rail each. They are joined to the fixed suspension rails of the building by means of rail curves and slide switches, and can be brought into any desired position by simple hand driving, so that the travelling rails always form a smaller or greater circle with the fixed travelling rails of the building. Below, the purifying material is shovelled from the purifying boxes into the car buckets, which are then drawn up through the trap doors by means of a winch car running on the track, as shown in fig. 42.

It is now possible, by means of the girders and winch car, to tip and spread the material at any point of the revivifying floor, or to take it up again at any point and return it through the flap doors to any desired purifying box in the house.

Suspension Electric Railway for Transporting Coal for the Municipal Gas-Works, Bromberg.

In these works, the hourly transport amounts to 20 to 40 tons of coal, which arrive in lighters on the River Brahe, and must be stacked within a period of three months. From stock, it must again be taken up and brought to the retort-house. As can be seen from fig. 43, there is an iron frame at the River Brahe with supports about 5 metres from the bank—thus forming a road between the river bank and the loading place. This frame is provided with a raisable projection, and has a reach of about 15 metres. The suspension railway built on this projection has therefore such a range that the barge can be unloaded for a length of 15 metres without towing. As shown in fig. 43, the suspended rail runs from the crane frame across the railway track parallel to the River Brahe. It then branches off almost at right angles and runs parallel to the track just mentioned. On reaching the coal depôt, it again branches off at right angles and runs beside this depôt up to its furthest extremity, keeping above the middle track. It then turns in a loop of 180 degrees and returns to the angle-station, and then on to the frame.

A travelling bridge with a range over the whole length of the storage depôt is connected with the track by means of two tongue rails. From this bridge the car buckets can be emptied or lowered to take up coal for returning it to the shed or breaker. The car buckets can also be let down for loading from the suspension track over the railway, so that the following requirements are satisfactorily dealt with: (1) The transport of coals from ships on the Brahe to the storage depôt, and an even distribution over the whole place to a height of 5 metres. (2) The conveyance of coals direct from the ships to the breakers. (3) The conveyance of coals from the ships to the coal-shed. (4) The conveyance of coals from the storage-depôt to the coal-breakers. (5) The conveyance of coals from the storage depôt to the coal-sheds. (6) The conveyance of coals from the railway trucks to the coal-storage depôt and the distribution here. (7) The conveyance of coal from the railway trucks to the coal-breakers. (8) The conveyance of coal from the railway trucks to the coal-sheds.

In order to shorten the way for all movements not taking place on the water, and effect a saving in time and power, a curve loop

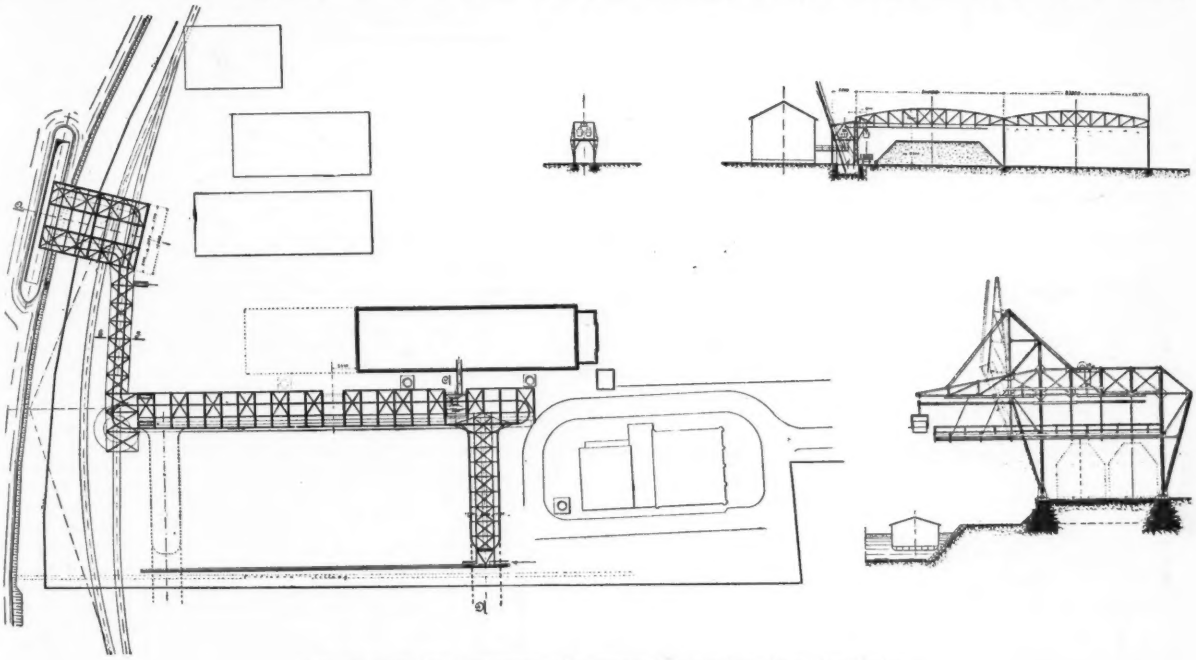


Fig. 43.—The Coal Transporter Arrangement at the Bromberg Gas-Works.

is arranged in the above-mentioned angle-station. For the present—that is, as long as there is only one crane frame constructed on the banks of the Brahe—only 20 tons of coal are to be conveyed hourly. The electric suspension railway car buckets have a contents of 10 hectolitre = 850 kilos. of coal; so that the capacity can be gathered from the following observations: The hoisting height of the winch at the crane frame amounts to about 8 metres at low water; the lowering of the bucket is effected at a velocity of 0·25 metre per second; the hoisting at 0·15 metre per second.

The lowering of the bucket therefore requires 8·0 : 0·25	32 seconds.
The hoisting of loaded buckets 8·0 : 0·15. . .	54 ,,
The distance each suspended electric railway car has to traverse from the crane frame over the whole suspension way and back again is about 440 metres; for which a velocity of about 1 metre per second is required . . .	440 ,,
Add for attaching an empty bucket in the ship and attaching the loaded bucket, another. .	74 ,,
From the above we arrive at a result for each journey, including hoisting and lowering, of .	600 seconds.

Consequently each car can make six journeys in an hour (3600 seconds) or convey 6 × 850 = 5100 kilos. Four cars are therefore necessary to convey 20 tons per hour. In conveying from the storage depôt to the coal sheds or breakers, from the railway trucks or from the coal-sheds to the breakers, the track is shorter; so that the hourly capacity is correspondingly raised. The hoisting heights are also smaller than when handling traffic from the ships. When the plant is enlarged at a later date, by the addition of a second crane frame, the capacity can be doubled by the introduction of a larger number of cars.

In order to give an idea of the small current required in such plants, without losing sight of the fact that the attendance can be effected by two workmen (if we except the coal hands in the ship), we will here make out a synopsis of the current required.

Current required for one journey of car as above described:—

Lowering of an empty bucket, about 1 kilowatt for 32 seconds . . .	= 32	kilowatt-seconds
Hoisting of a loaded bucket, about 4 kilowatts for 54 seconds . . .	= 216	,, ,,
Travelling of loaded car, about, 1·50 kilowatt, on average 160 seconds	= 240	,, ,,
Travelling of an empty car, about 0·70 kilowatt on average 280 seconds	= 196	,, ,,
Total for one journey . .	= 684	kilowatt-seconds

= 0·19 kilowatt hours or 4 × 6 = 24 journeys, per hour, together 4·56, or, in round figures, 5 kilowatt hours for the conveyance of 20 tons from the ship to the stock-yard.

In conveying from the ship to the coal-sheds and from the depôt to the sheds and breakers, &c., the power required would alter in proportion to the length of the track to be covered by the car loaded and unloaded, as also by the smaller hoisting height and by a possible larger number of cars to be conveyed per hour. This calculation of current becomes of special value when we consider that these low figures are in question not only during the time of working, but, above all, during the starting and the short period of hoisting. In comparison with cranes, the advantages of these small travelling winches are very exceptional. In the former case, hoisting motors of 15 to 50 H.P. are required

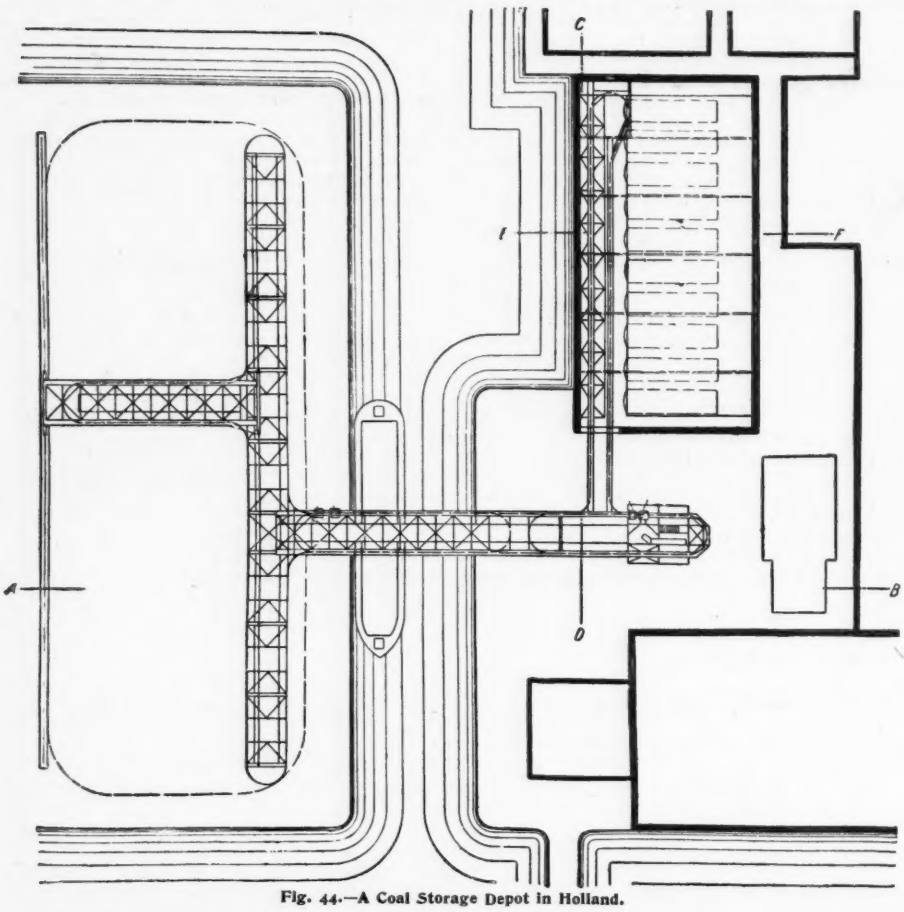
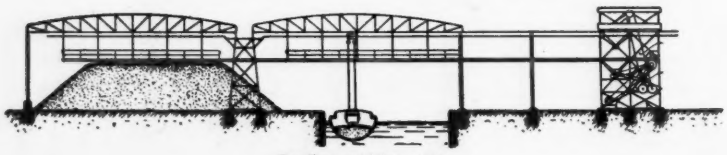
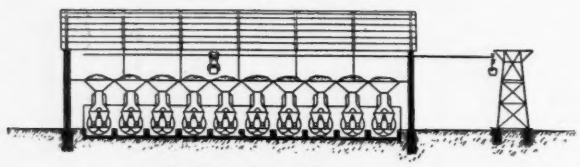


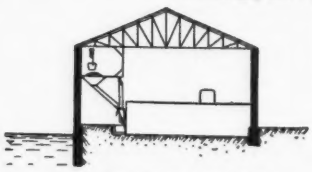
Fig. 44.—A Coal Storage Depot in Holland.



Section on Line A B.



Section on Line C D.



Section on Line E F.

for the same capacity, which, when suddenly switched on, exercise very high current shocks on the network of lines; in the latter case, only small motors come into question which, in part, like the travelling motors, can be switched on without resistance. The means of working are similar to those employed in the plant for the Brussels Municipal Gas-Works, already described—that is, winch cars, travelling on double-headed suspension rails, are employed, as shown in fig. 27—*ante*, p. 370.

Suspended Electric Railway for a Coal-Depôt and Boiler-House Plant in Holland.

This plant, which is arranged with long-distance operating, is or conveying coals arriving in vessels to the storage depôt or to the boiler-house. The cars employed also run on double-headed suspension rails—figs. 30 (*ante*, p. 371) and 44—as they have to cross over the fixed bridge spanning the port, connected with a rigid frame arranged along the storage depôt, on to a moveable bridge spanning the depôt. The arrangement of the bridge, as also of the tracks, is such that two rail tongues rest on the inner fixed rail track of the storage depôt. These rail tongues effect the connection between the suspension rails of the travelling bridge, so that the whole length and breadth of the store can be reached.

The working is as follows: A car, arriving at the fixed port-bridge, lowers its empty bucket into the ship, where it is detached from the hanger and replaced by a full one. The workman engaged on loading switches the current on, whereupon the winch starts to work and hoists the car-bucket until its hanger strikes against the switch-off lever projecting from the carriage. By this means, the hoisting motor is switched off and the travelling motor is simultaneously switched on, so that the carriage commences to run. The car now travels over the whole loop-shaped track, over the fixed bridge, the fixed frame, and the travelling bridge, where a striker is placed at any desired point, causing the car-bucket to tip and discharge its load to stock.

The car, however, travels further without any interruption, and arrives over the ship empty. The workman in the vessel again switches the travelling motor off, the car-bucket descends, and is again exchanged for a full one. The switch apparatus for this description of operating is enclosed in a small moveable cabin joined up to the conduction by means of a plug-contact and flexible cable. For withdrawals from the storage depôt, an empty car-bucket can, of course, be lowered at any desired point, where it is filled and despatched in the same manner, with the difference that a switch fastened on the travelling bridge is employed to regulate the current. The car then runs on the section over the port bridge to the boiler-house lying on the other side of the port.

Electric Suspension Railway for the Transport of Coal and Coke for the Berlin Municipal Gas-Works.

Fig. 45 shows the electric suspended railway which serves for the conveyance of coal and coke for the Municipal Gas-Works, Berlin. It is here a question of conveying coal arriving by water from the barges to the two coal-storage depôts, or to the coal bunkers by the two retort-houses, and again to take up the coal from the storage depôts for conveying to the bunkers. The coke from the retort-house comes to the loading places, and is either destined for loading into railway trucks or else for stacking in the yard. It must also be taken up from the storage depôt and conveyed to the railway trucks. The hourly capacity of the plant is 10 tons of coal and 6 or 9 tons of coke, taking into account the longest transport distances. The situation of the track can be at once seen from fig. 45. It consists of double T-rails suspended in iron supports. At the moorage of the barges the track projects about 7 metres beyond the embankment-wall, so that electric suspension railway cars can run over the barges at this point and take up the coal direct. The single sections of the track are connected by slide-switches, set for the desired direction from the ground, and each provided with an automatic block-appliance.

The blocking is thus effected: The travelling conduction of the line which is open when the switch is at a certain position is deprived of current. The car which is running towards the switch on an open line receives no current, and must therefore stop before reaching the switch; and not until the switch has been set for the intended direction is the current renewed so that the car can proceed. This arrangement entirely obviates the derailing of the car through the wrong setting of points. The electric suspension railway cars are arranged for automatic working, and the construction is as figs. 31 and 32—*ante*, p. 371. They are also furnished with an automatic guiding appliance arranged to carry out, by means of a magnetic switch, all the successive movements of the travelling and hoisting motors. The car carries a hanger on the hoisting ropes of the winch, in which the bucket is so placed as to be capable of a rotary motion, and is kept in an upright position by locking apparatus. After this is released, the bucket is emptied by tilting. The buckets are also provided with running wheels, so that they can be easily pushed by hand, under the suspension electric railway from the loading point.

The emptying of the buckets takes place automatically at the storage depôt and coal-bunkers. For this purpose, a travelling striker is provided for each storage depôt track on a special rail

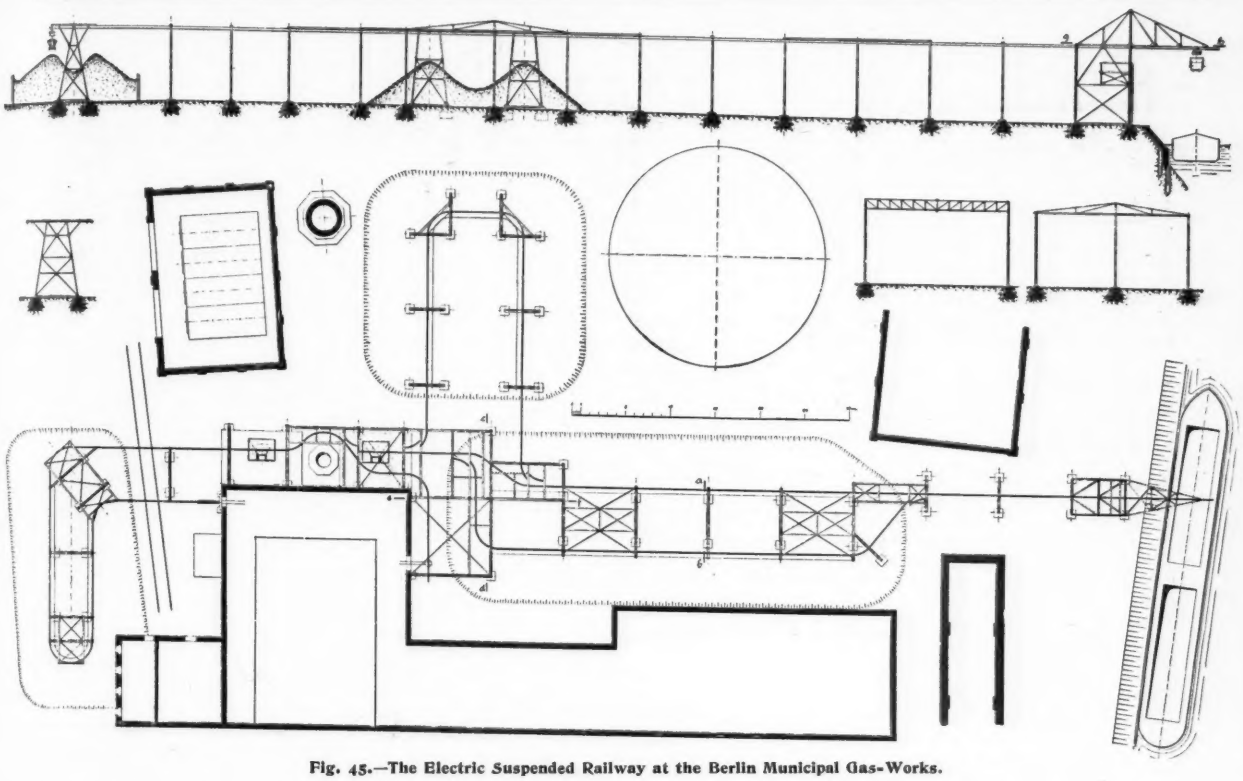


Fig. 45.—The Electric Suspended Railway at the Berlin Municipal Gas-Works.

parallel to the track, and which can be moved to keep pace with the advancing stacking in the depôt by means of a rope and a small hand winch. Consequently, the suspended electric railway cars can be emptied automatically at any point of the depôt. For emptying electric suspended railway cars into the bunkers, simple, shiftable strikers are provided, which are worked from the ground by means of guide ropes. The electrical equipment of the line is so arranged that the cars both run and stop at the loading stations automatically. After emptying in the storage depôt, the cars turn automatically and return to the loading station. The steering of the cars for lowering and hoisting is done by a transportable starter joined up to the conduction by means of contact boxes and movable cables. Such a contact box is provided on each of the following: Loading frame, barge-moorage, on all loading places for coke, and at the place for loading the coke into railway trucks. On the storage depôt track the contact boxes are distributed at suitable distances over the whole place, so that a suspension electric railway car can stop at any point of this line and be steered for lowering and hoisting by means of the starter at the nearest connecting point.

In the jib-crane at the moorage station for the barges, there is a weighing appliance attended to by the workman who superintends the loading. Behind this balance is a counting apparatus, which records the cars coming from the boats. The working of the plant is as follows: Assuming that coal is to be conveyed from the ship to the storage depôt, a workman in the boat hangs a bucket in the hanger, whereupon the jib-crane driver switches on the steering. The winch then fetches the loaded bucket out of the vessel, and, after hoisting it to its highest point, switches off. Thereupon the electric suspension railway car starts to run. It runs along the track at an automatically regulated speed, and, arriving at the unloading station, is emptied by the release of the striker of the locking appliance. After emptying, the bucket again rights itself, and the car, arriving at the end of the storage depôt, turns automatically and runs back to the loading point, where it stops. The empty bucket is let down into the vessel by switching on the steering, is unhooked and replaced by a loaded bucket; and the same process is again repeated. In conveying coke from the loading point in use (for the time being) to the railway, the procedure is very much the same, but with the difference that the loaded buckets are first of all let down close above the truck by the workman at the loading station switching on the steering, and are then tipped by hand into the truck.

As above described, the few manual operations necessary are the simplest imaginable, and can even be carried out by an inexperienced labourer. As two suspension electric railways are provided, the following simultaneous movements are possible: Conveyance of coal from the ship to stock; conveyance of coal from its loading point to the railway or to stock, or, again, from stock to the railway. Coal can also be conveyed from the ship and from stock to the railway at one and the same time. The speed of the cars on the line amounts to 90 metres per minute; whereas the hoisting speed is calculated at 9 metres per minute.

Working Expenses.

To calculate if the plant pays its way, or to make a calculation of its working expenses, the following points, gathered from a publication on the Mariendorf Gas-Works, Berlin (by Messrs. Drory and Körting, the Managers, and Herr Schüller, the Architect), must be kept in view, but to which we will only briefly refer, as they are partly no longer applicable.

In gas-works large quantities of coal must be stored every summer and withdrawn in winter. This coal naturally covers a large area, as the dumping height is limited. With the employment of fixed conveyors, a comparatively large number would be required in order to obtain a range over the whole area. Such conveyors, however, cannot be turned to the best advantage, because coal is only stacked and withdrawn from one and the same spot once a year. Consequently, to fully utilize a conveyor appliance, the same must be movable, or, in other words, the conveyor must go to the coal and not the coal to the conveyor. The total length of the conveyor will then equal the length *plus* the width of the storage depôts, giving a minimum length at a reasonable cost. Even if this is the case, the net estimated profit, calculated with manual labour, would not be very large; so that smaller gas-works could hardly expect any economic advantage by the introduction of mechanical coal transport. Large plants, however, must introduce such transporters for the sake of capacity and easy supervision.

The conclusions drawn from the remarks in the above extract with regard to small gas-works are no longer applicable now that electric suspended railways have been introduced. The whole idea of producing these easily movable conveyors is based on the assumption that it can never be an economically correct policy for small gas-works, with intermittent transport for small quantities, to procure transport plants which would involve heavy responsibilites, not only with regard to the original cost, but perhaps to a still greater extent when we compare the proportion of total weight for transport to the effective load handled. The necessity of the conveyor going to the coal, instead of the coal to the conveyor, is fully met by an electric suspension railway.

The further requirement, which is almost a matter of course—that the ordinary untrained yard labourer must be able to attend to these transporters—can be taken as fulfilled from the above remarks. This naturally furnishes a solution of what is perhaps the most important question in small gas-works—I mean the possibility of dispensing with the skilled, and consequently expensive, attendance of crane drivers and mechanics. It has also been pointed out that electric suspension railways only require current while actually at work, and in exact proportion to the bulk handled. A further vital point, which must not be lost sight of, is that the proportion between effective capacity and dead-weight is exceptionally advantageous in suspension electric railways, as the difference between the two is never very great; and the actual power used is, to a considerable extent, controlled by the net weight of the coal bulk raised or conveyed, and not by the weight of the conveyor itself.

These remarks at once show that a very inaccurate picture would result in comparing the working expenses in a large gas-works (Mariendorf, for instance) with those of a small plant (Schiedam, for example) in such a manner that not only the cost of labour, current, and rolling stock is included, but also the interest and sinking fund of the whole plant. There are no two gas-works in the whole world which can show even comparatively similar conditions in size, locality, or development; so that the

cost of mechanical transport plants, whether ropeway or electric suspension railway, cannot be subjected to direct comparison. These various local conditions make it equally impossible to lay down a normal stand for the cost of a plant (say) per ton, cubic metre of coal carried, or per square metre of ground covered. It is only necessary to refer to the question of coal stacking in sheds or in the open—touched upon at the commencement of this article, and which necessitates totally different transport arrangements.

It will be at once clear to every engineer that, generally speaking, electric suspension railways show up more favourably with regard to cost than wire-rope driven railways, especially if the latter have expensive ramifications and are compelled to fight against adverse ground conditions. It can thus be assumed that the cost for sinking fund and interest on electric suspension railways—taken, for example, per square metre of ground covered—work out lower than on rope-driven railways. This is probably more particularly the case with small plants; whereas both systems will about stand on one level for large plants.

The only practical comparison that can be made is the amount expended for working; and I should now like to conclude with a statement of the calculated working cost of two typical plants—Mariendorf and Schiedam. In the former case, the hand-working originally projected has been taken as a basis for this comparison; and in the following table the cost per ton of coal stacked, with due consideration for the actual existing distances and hoisting height, is as follows:—

Field Ropeway. Mariendorf. 125,000 tons per year.	Wire Ropeway.	Suspended Electric Railway. Schiedam. 40,000 tons per year.
M. 40,000	21,000	5,200
32 pf.	16·8 pf.	13 pf.

This estimate of cost shows all expenditure for current, wages, and sundry expenses, without interest and writing-off, in two plants with approximately similar transport distances.

UTILIZING THE WASTE HEAT FROM GAS-ENGINES.

All users of gas-engines will doubtless welcome any contrivance which adds to the economy and increases the range of usefulness of their plant; and therefore their attention may be called to an appliance by the use of which it is claimed a substantial saving in both prime and working costs may be effected where steam or hot water is required either for heating or washing purposes. In such cases, the general practice is to provide a coal-fired boiler for this duty; but when the appliance in question—the Wilson counterflow exhaust gas-boiler, shown in the accompanying illustration—is employed, the heat from the exhaust gases is utilized to provide either steam or hot water. It has been found in practice that 2½ lbs. of water can be evaporated per hour per brake horse power of a gas-engine by the application of the exhaust heat to the boiler, which is specially designed for the purpose; and by the counterflow principle—one of the chief features of the appliance—practically the whole of the heat (usually lost) is turned to useful account. In addition, the boiler acts as a perfect exhaust silencer; and the gases, after passing through it, escape into the atmosphere without causing the usual nuisances of heat and noise. We are informed that at one works alone these boilers generate steam from gas-engine exhaust gases to an amount representing a saving of 70 tons of coal per week.

The arrangement of plant here referred to is accepted by the Insurance Companies on the usual terms, requires no skilled attention, and it is stated that users have found that practically no expenditure is necessary for upkeep.

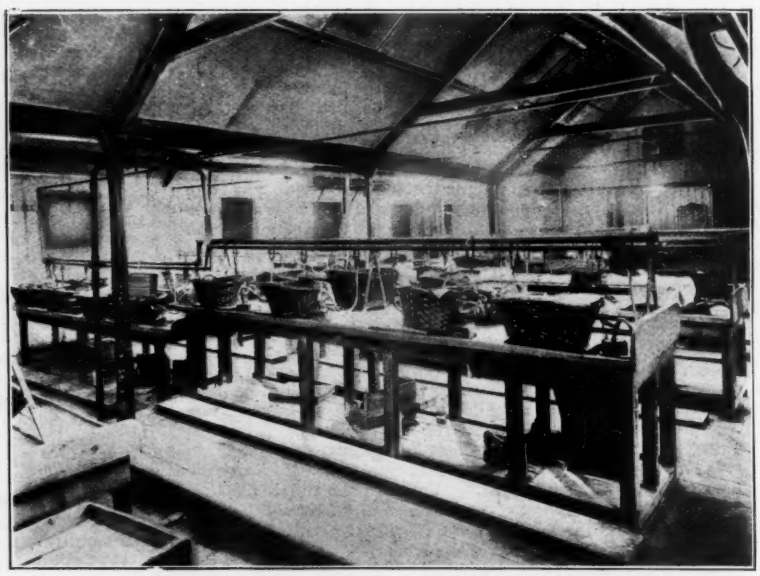
The makers are Messrs. Andrew Barclay, Sons, and Co., Ltd., of the Caledonia Works, Kilmarnock.

THE USE OF "BLAND" LIGHTS IN A LAUNDRY.

The accompanying illustration possesses a double interest from the fact that it testifies to the suitability of gas not only for the lighting of spacious interiors, but for enabling photographs to be taken of them.

The picture here reproduced is a view of the laundry at the Alpha Works, Coburg Road, Old Kent Road, in two departments of which the old lights have been replaced by "Bland" inverted incandescent gas-burners. In the laundry, thirty-one of these have taken the place of one hundred and forty-eight naked No. 8 Bray burners; while in the cutting-room fifteen of them have displaced twenty-seven fishtail and two ordinary incandescent burners.

The Manager of the laundry (Mr. Robert King), when writing to Messrs. Bland and Co. as to the installation a short time ago, said: "We find the upkeep most reasonable, and are getting a much better light." We may add that the photograph from which the illustration was prepared was taken at night by means of the Bland light only.



At the *conversazione* of the Royal Society at Burlington House last Wednesday, among the highly interesting scientific instruments on view was a self-contained Féry radiation pyrometer, exhibited by the Cambridge Scientific Instrument Company, which permits of direct reading without the aid of a galvanometer. The total radiation of a furnace is focussed by a concave gilt mirror on a little spiral, 1·5 millimetres in diameter, built up of three metals—gold between platinum and silver. As the temperature rises, the spiral uncoils, and the pointer travels over the dial next to the eye-piece of the short telescope tube, which contains the whole apparatus. The furnace used was a Féry electric furnace. When the hand was held between the hole of the furnace and the pyrometer, the pointer at once receded. As the whole pyrometer is heated by the radiation from the furnace, the instrument would record too high temperatures; the pyrometer case can therefore be closed by a double shutter, when the pointer will go back to zero. Another apparatus shown by the Company was a universal portable electrometer designed by Mr. C. T. R. Wilson, F.R.S., of Cambridge, for measuring atmospheric electricity, radioactivity, &c.

TURKISH COAL.

By John Gandon,

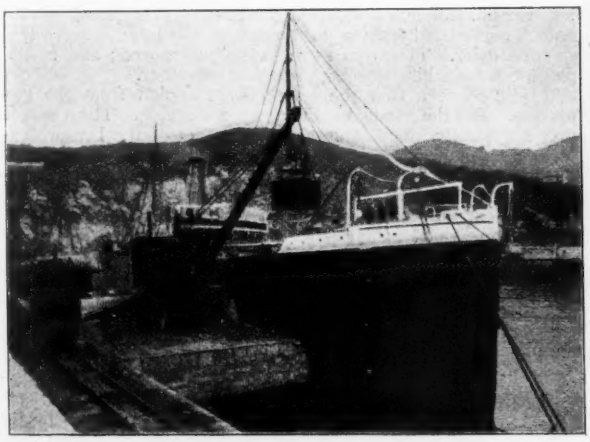
Engineer to the Ottoman Gas Company, Smyrna.

It was stated at the last meeting of the Ottoman Gas Company, Limited, that the Directors had arranged to obtain a large proportion of their coal supplies from mines in Turkey; and it may be of interest to gas engineers at home to know something more about the development of coal mining in the country, and the use of the coal for gas production.

Port of Zongouldak.

The province of Anatolia is rich in excellent coal; but the difficulties of transport and labour, added to peculiar mining regulations, have prevented proper development.

The principal coal basin lies between Heraclia, 130 miles from Constantinople, and Iniboli on the Asiatic coast of the Black Sea. Here the Société des Mines d'Héraclée—a French Company, founded in 1896 and having a capital of £1,200,000—has mining rights over some 30,000 acres. The centre of the Company's activity is at Zongouldak, where they have a port, protected by a mole 1000 feet in length, and where up-to-date jetties and machinery permit of the direct loading, into steamers of the largest tonnage, of 3000 tons of coal per day. The Company have



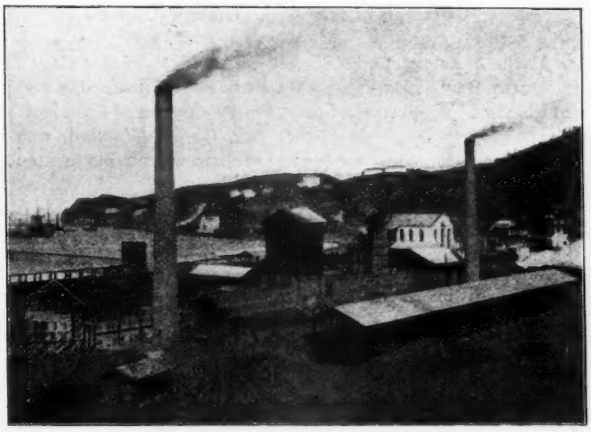
Loading at Zongouldak.

also a briquette plant here for producing 70,000 tons of fuel per annum, a coke plant (Coppée-Bernard) equal to an output of 35,000 tons of coke per annum, and also extensive washing and screening plants. Another feature of interest is that the several pits of the Company are connected with the port by 15 miles of 1-metre gauge railways, and four miles of aerial lines—all fully equipped, and capable of dealing with 6000 tons of coal per day. A scheme has also lately been put forward by the Company for opening up fresh pits, and laying a line of railway to Kavak, on the Bosphorus.

The output of this field (which in 1896 amounted to 157,000 tons) last year exceeded 700,000 tons, of which quantity four-fifths were extracted by the Société d'Héraclée, and the remainder by several smaller pit owners.

Zongouldak—admirably situated on the Black Sea trade routes, and within easy distance of Constantinople—does a good bunker trade; a large proportion of the output being thus disposed of.

The coal is bituminous, and well adapted for gas making; an increasing quantity being employed for this purpose. It contains



Coke Ovens and Washing Plant at Zongouldak.

a very low percentage of sulphur, produces a first-class hard coke, distils easily, and gives in practice 10,000 cubic feet of 15¼-candle power gas per ton.

Another field now receiving attention is situated at Keshan, in European Turkey, 50 miles from the Gulf of Saros. The Keshan Collieries Company, Limited, supply the following analysis of this coal as made by their Consulting Chemist:—

Volatile matter	56·85 per cent.
Sulphur in coal	0·39 ,,
Gas per ton	12,198 cubic feet.
Illuminating power	18·30 candles.

The figures denote the richness of the coal for gas making.

Power Station for the Aerial Line at Heraclia Mines.

Spring Meeting of the Southern District Association.—In accordance with the intimation given by the President of the Association (Mr. Harold W. Woodall) on the occasion of the recent annual general meeting, the members have been invited by the Chairman and Directors of the Bournemouth Gas and Water Company to hold their spring meeting in the town and at Poole; and it will take place on the 30th inst. We learn from the Hon. Secretary of the Association (Mr. A. F. Browne, of Vauxhall) that the day's programme will include a visit to the Bourne Valley Gas-Works, where the Woodall-Duckham vertical retorts will be inspected; luncheon at the Canford Cliffs Hotel, where the members will be the guests of the Company; and a visit in the afternoon to the Company's new works at Poole Harbour.

Midland Association of Gas Managers.—We learn from a circular issued by the Hon. Secretary of the Association (Mr. Charles Meiklejohn, of Rugby) that the Committee have decided to make the spring meeting this year an excursion, and to invite ladies to participate in it. It will take place on the 30th inst., and will cover the picturesque Matlock district. The party will leave Birmingham (Midland Station) by the 11.47 a.m. train, to which dining saloon carriages will be attached. On reaching Derby luncheon will be served in the train, and Bakewell will be reached at 1.53 p.m. Brakes will be in readiness to drive the party to the romantic and historic Haddon Hall, and, time permitting, to Chatsworth, and back to Matlock Bridge, where they will join the ordinary train at 5.15 p.m. for Ambergate. There the saloon carriages will be attached to the express leaving at 5.41 p.m.; and tea will be served on starting. Birmingham will be reached soon after seven.

COKE OVENS AND GAS-WORKS.

At the Meeting of the Society of Arts last Wednesday—Sir STEWART BAYLEY presiding—Mr. PAUL SCHLICHT read a paper, to which he had given the title "The Production of Coke and its Application to Domestic Fires." Mr. Corbet Woodall, who it was expected would have been in the chair, was unable to attend; but a few other gas engineers were present.

In the opening passages of the paper, the author explained that his recent activities have had to do with the production of bye-product coke for metallurgical purposes and the advocacy of the production of improved coke by gas companies; and he has consequently been led to investigate the different methods of coke and gas production in the United States, England, Germany, Austria, and Belgium, with a view to finding the best and simplest forms.

THE USE OF BITUMINOUS COAL.

In this section of the paper, Mr. Schlicht said the impression vaguely prevails that the *per capita* consumption of coal is a fair criterion of a nation's rank in the world's civilization. The truth of this statement, however, depends greatly upon whether the use approaches the highest economic standards of the day, or, if not, whether the abundance of a country's coal resources excuses misuse and waste. And the author went on to show that the state of the atmosphere in our great English cities and towns is proof positive that use—industrial and domestic—does not approach the highest economic standards of the day. He contrasted our atmosphere with that in the eastern portion of the United States, where the atmosphere is not blackened by domestic fires. Anthracite is the popular fuel, but latterly bye-product coke has come into vogue in the communities where it is being produced. The contrast was not to our advantage, though, thanks to the admirable and disinterested efforts of the Coal Smoke Abatement Society, and the exploitation of gas as a substitute for coal by the Gas Companies, the atmosphere of London is conceded by the author to be much less offensive than it was twenty-five or thirty years ago. Here he introduced on the lantern screen two photographs lent him by the Gaslight and Coke Company, showing the effect of chimney smoke on the atmosphere. The one was taken from the roof of Cannon Street Station before the lighting of fires in the early morning; the other from the same position three or four hours afterwards.

In addition to wastefully heating about fourteen times the air necessary to burn the coal, and generously sending it out of the chimney into the open, together with enough water in the form of steam (impregnated with sulphuric acid) to produce a miniature fog, we destroy, the author said, per ton of coal burned, as high as 100 lbs. of coal tar, countless constituents valuable in the arts and medicine, oils that give promise of success as the basis of illuminants and heating agents, and that are already being used for motor purposes as substitutes for petrol, as well as heavier oils, together with solids that can be employed advantageously in road-making and road improvements, in addition to their regular commercial uses; considerable quantities of ammonia, useful in the arts and invaluable in the form of sulphate of ammonia for agricultural and other purposes; cyanogen, in not inconsiderable quantities, either in the rough as prussiate of soda, or that may be converted into the various cyanogen products of commerce. If this same ton of coal were used in the modern bye-product oven, there would, he said, be in addition to the products named, 14 cwt. of coke suitable for domestic and metallurgical purposes which improved coke can be made to serve a much more useful purpose than the raw coal, giving in addition thereto at least 5000 cubic feet of gas suitable for illumination, heating, and power purposes. Small wonder that (the late) Sir William Siemens in an address before the Glasgow Science Lecture Association, in 1881, declared: "I am bold enough to go so far as to say that raw coal should not be used as fuel for any purpose." And this was before the advent of the modern bye-product oven and its successful use in the manufacture of illuminating gas and a high-grade coke! Fuel that does not smoke, that will burn brightly, radiate more heat, last longer, can, the author remarked, be produced from this very coal if the gas companies in London and elsewhere in England can be shown the economic advantage to be secured by adopting the modern bye-product oven so successfully employed in the United States. A high grade of coke of different kinds can be economically produced in such ovens, of varying degrees of density, porosity, and clean volatile matter, by merely varying the coking periods. Flaming coke, for instance, can be made in from four to five hours less time than the low volatile coke required for metallurgical purposes; a certain percentage of hydrogen and hydrocarbons that during the latter part of the coking period require much heat to expel, being allowed to remain in the coke. Coke for metallurgical purposes which should have less than 1 per cent. of volatile matter can be made in the same ovens, thus supplying fuel for domestic, metallurgical, and other industrial needs.

THE PRODUCTION OF COKE.

In this section, the author of the paper went back to 1612 in tracing the history of the production of coke. But sufficient for to-day is modern practice. The art of making coke as practised to-day, consists, generally speaking, in the expulsion by the heat furnished in the burning of all, or else a portion of the gaseous constituents of the coal: (1) Within a coking chamber into which restricted quantities of air are admitted; or (2) heated externally thereby in a chamber from which air is excluded. The means for carrying out this art consist of ovens of fireproof material. Ovens are roughly divisible into bee-hive ovens and retort ovens.

The beehive oven may be divided into (*a*) ordinary ovens in which all products except the coke are wasted, and (*b*) waste heat ovens in which the products are carried away by means of flues so that their heat may be made to serve a useful purpose. The retort oven may be divided into horizontal and vertical. The horizontal ovens may be divided into (*a*) non-bye-product ovens, and (*b*) bye-product ovens with horizontal or vertical heating-flues. These may be further divided into non-recuperative and recuperative, and non-regenerative and regenerative. The vertical oven is a bye-product oven, and usually non-regenerative. The coal is fed into the top of the oven, and the coke discharged by gravity from the bottom. The charge is usually about 2 tons; and the coking period with certain coals is as short as six hours.

The well-known retort ovens may be divided into those with horizontal and those with vertical flues. The type of horizontal-flued oven is represented by the Semet-Solvay, the Huessener, the Simon-Carvés, and the Rothberg; the vertical-flued oven by the Coppée, Otto-Hoffmann, Otto-Hilgenstock, Collin, Koppers, and Von Bauer. Among vertical-flued ovens, Coppée, the author understands, has under construction a regenerative oven intended to yield a large gas surplus. The Otto-Hoffmann, the Koppers, and the Collin are the ovens which make substantial claims to producing the largest yields of surplus gas, and accordingly merit consideration in connection with gas production. The adherents of Collin and Koppers claim superiority for their ovens. The claims made for the new Collin oven are that it will give 10 to 15 per cent. more gas and materially shorten the coking period. Otto-Hoffmann and Collin ovens have regenerators common to all the ovens. Koppers has separate regenerators for each oven. In the Otto-Hoffmann and Koppers ovens, one half of the oven is heated directly; the other half indirectly. In the directly heated half of the oven, the gas is burned at different points along the bottom of the vertical flues; the products of combustion rising in the one half descending in the other half of the oven, but heating that to only a moderate degree. Alternate heating causes some differences of temperature. Collin proves one-half of the oven to be always cooler than the other. In his latest oven which may be built higher than ordinarily, he has methods for directly heating by contiguous vertical flues continuously from the bottom upward, and from the top downward.

The author introduced mention here of an interesting bye-product plant he recently visited in Bohemia, at Wesseln, near Seplitz. From the brown coal of that region, a very profitable industry is carried on in the making of coke for domestic purposes—coke of high grade. The coal contains about 35 per cent. of water. All the tar distillates are produced besides aqua ammonia, benzol, and gas for power purposes. The domestic coke finds a ready market, at a good price, in the large cities. It is shipped daily. The oven is the Appolt improved; and in this plant, the quenching is being done without water.

It will be seen that the coke-makers copied from the gas-makers. But the gas-makers have been thinking. The recognition has tardily come that the larger units of the bye-product oven, its greater life, the superior yield and quality of its products, especially its superior and varied cokes—domestic, locomotive, general steam-raising, and metallurgical—should long ago have impressed European gas managers, especially after the excellent paper of Mr. Charles Hunt, now President of the Institution of Gas Engineers, read some twelve years ago, and the elaborate paper of Dr. F. Schniewind, read before the International Engineering Congress in 1901, which paper was so rich in reliable data, diagrams, and tables.

Coking is a carbonizing process—so is gas-making. The processes in the gas industry of to-day are not as efficient carbonizing agents as those employed in the modern coke industry, and, generally speaking, the results per ton of coal carbonized in the bye-product oven, of even low gas production, show a more profitable carbonizing system than does the older diminutive gas-retort system.

Some of the foremost gas engineers and financiers of America are interested in gas-plants that owe their prosperous condition to the modern bye-product oven. It is only fair to meet the objections that have been made by equally reliable authorities in England. They say they want gas—all the gas. They want to have as little to do with coke as they can help. They may want all the gas, but do not get it. In a recent test made for me in America, it was shown that 25 per cent. less gas than was produced in the bye-product ovens was produced in the modern gas retort. The average candle-power was also less, and the coke very porous. A careful calculation shows that if all the gas for heating the ovens were added to the surplus gas, and the ovens were heated with coke or water-gas, or bye-product producer-gas, the result would not be as favourable as if self-generated and automatically fed oven-gas were used for the heating, provided always that a market could be made for the improved coke.

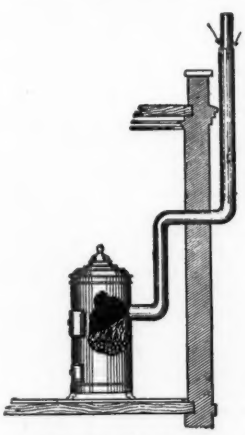
The economic advantages of the modern bye-product oven were, as I have already stated, so well recognized years ago in America, that ovens were built near Boston in which coke is made, and all the gas to illuminate Boston and the surrounding towns is manufactured. At Camden, New Jersey, some twenty

towns are supplied with gas by the Camden Coke Company, controlled by the Public Service Corporation of New Jersey; gas being piped as far as Trenton—a distance of some 40 miles. The gas for the City of Baltimore is made almost entirely in bye-product ovens, and piped from the coke works at Sparrows Point. Both in Boston and Camden, the exploitation of bye-product coke has been very successful for domestic, steam-raising, and metallurgical purposes. It has displaced anthracite coal to a considerable extent in many places, and is used successfully on locomotives and as a competitor for beehive oven coke.

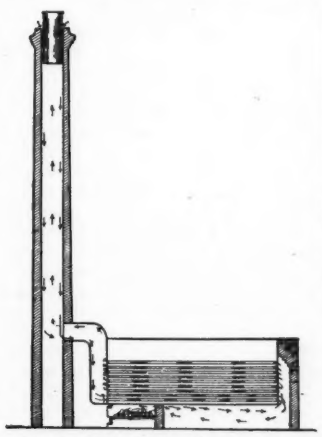
Kinds of Coke.

To the layman, observed the author, the word coke is a name applied to a product of the gas-works generally that has never been held in high esteem by those who use it, those who make it, or those who have heard of it; but this has been due in part to the ignorance of the best method of using it. Its porosity makes it, bulk for bulk, inferior in calorific value to the coal from which it is made; but it is of greater radiating power if properly used.

The beehive coke is very wastefully made, to the discredit of two such great industrial nations as England and the United States; 90 per cent. of the metallurgical coke being still produced in beehive ovens. The bye-product oven is coming into favour with the progressive ironmasters of England. If comparisons are carefully instituted between beehive oven and bye-product cokes, it will be found that chemically the constituents are practically identical. Considered physically, the hardness and effective porosity of the latter make it certainly equal, if not superior, to the former. The silvery colour of the beehive coke, due to a graphitic coating believed to protect the coke from dissolution by the hot gases of the blast furnace, is made up for by greater hardness and a more uniform porosity in the bye-product coke. So great, however, is prejudice, even at this late day, and



Experimental Stove.



The Schlicht Combustion Process.

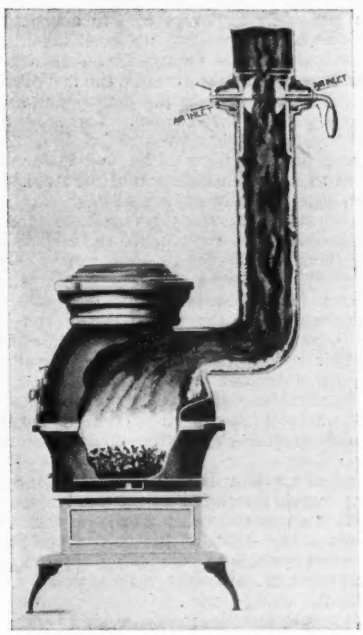
Showing the Downward Course of the Air and the Upward Central Current of the Products of Combustion.

in the light of what is being done by the foremost ironmasters, that important industrial centres in England are still prejudiced against the use of bye-product coke. In both cases the volatile constituents of the coal are either driven off or a portion of them is deposited to add to the bulk of the coke. In the one case, however, these gases are generally driven off into the open air and wasted; in the other they are saved. The fact is that, even if 1 per cent. of volatile matter should exist in beehive coke, it would be considered a disadvantage. The essential difference, therefore, in the two cokes is largely imaginary. In the modern bye-product oven with improved uniformly continuous heating systems, cokes of varying degrees of hardness and inflammability can be produced in periods varying from eighteen to twenty-four hours.

The gas-retort coke made by nearly every gas company making coal gas, is used for heating, steam-raising, and the production of water-gas, and, in London, in the cement industry. On account of its porosity and lack of uniformity, it does not possess the fuel value, burned in the ordinary way, that it does burned with proper draught and special coke-stoves; but grates have been constructed, and a furnace designed for burning coke with a long flame—invented by Mr. George Wilton, formerly of the Gaslight and Coke Company, now Managing Director of the Chemical Engineering Company—which finds much favour with gas companies, and is capable of general application.

Application of Coke in Domestic Fires.

Sir William Siemens devised a system of burning ordinary porous retort coke in an open grate, in combination with gas, and introduced quite a number of these fires. Owing to the lack of density of ordinary retort coke, the author has been told, it has not found favour generally; the coke occupying nearly twice the space of ordinary coal, presenting disadvantages to the user not



Coke and Anthracite Stove.

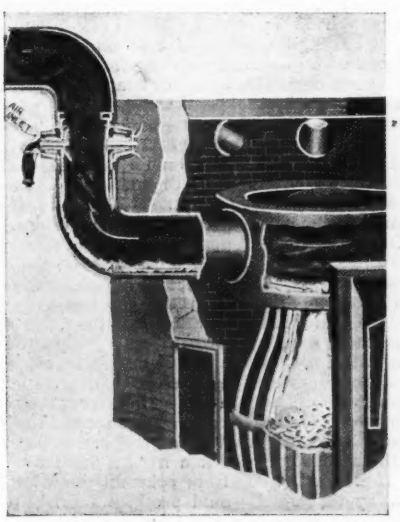
made up for by its advantages of smokelessness and of greater radiating power. Improved coke, of course, overcomes the objection to bulk.

The late Sir Charles Cookson, in a paper on "Coke (Charred Coal) as Domestic Fuel," at the Smoke Abatement Conference in 1905, described his use of gas in combination with anthracite and coke, showing conclusively the cheapness of gas for lighting fires in place of wood, &c. Improved coke would, as a matter of course, work more effectively in this combination, which is simple and inexpensive. Several types of grates and stoves now made appear to be well adapted to the burning of improved coke; and from what he has seen of it in the burning of ordinary retort coke, the author is of the opinion that it will work successfully. In the United States he has secured results both with ordinary retort coke and with bye-product coke that indicate that the physical and chemical change from raw coal to coke is a most advantageous one, if the coke is properly burned. He is confident that improved coke for domestic fires will revolutionize the fuel and gas industries.

The Royal Commission on the Coal Supply have recommended central heating as a means of economizing fuel. The author submits that coke fires can be kept all the winter with a very small expenditure of fuel in simple central-heating systems that would keep ordinarily cold passages and rooms comfortably warm. With improved coke, and proper coke burners, the efficiency of central-heating systems will be much improved.

A New Method of Combustion.

The author next touched upon a new method of combustion, the principle of which he has succeeded in applying to chimney improvement and to coke-burning devices. It is readily applicable to kitcheners, grates, steam boilers, and locomotives for improved coke utilization.



Central Air-Heating Coke-Furnaces.

In 1894 he made the discovery that in accepted theories of chimney drafts certain factors had not been taken into account, for he had produced results regarded as contrary to the well-established theories of chimney draught, the law of diffusion, and Tyndall's classic experiments on the diathermancy of air. He showed on the screen a closed stove. This stove, it was seen, was connected to a round sheet-iron smoke-pipe, about 6 inches in diameter and (including joints) 25 feet in length. A tube, extending about 18 inches into the top of the smoke-pipe and 18 inches outside, was centrally supported in such a way that an annular space equal to about 25 per cent. of the area of the smoke-pipe surrounded this short pipe. In his experiments with this, the fire burned brightly for 26 hours; and the economy in anthracite—roughly considering comparative temperatures—was fully 50 per cent. The observations made of the products of combustion passing out of the top of the short tube, and the descent of air through the annular space, justified the author's contention that air and products of combustion could be caused to flow in opposite directions in the same flue or chimney—the down-flowing air absorbing the heat from the outgoing products of combustion, whereby the oxygen of the air more effectually acted on the combustible elements of the fuel in the place of combustion.

It was perhaps due, primarily, to the late Russell Sage, of New York—who was largely interested in the gas business, and who saw in the author's improvements means for the better utilization of coke for heating—that he seriously turned attention to a study of the various systems of gas-making in the United States. But it was Mr. James W. Ellsworth, a large colliery owner, who first saw clearly the significance of the bye-product oven in its relation to the gas and fuel industries. Mr. Ellsworth personally made tests with coke for domestic heating with apparatus that the author designed, and estimated his saving over the best anthracite coal as reaching fully 40 per cent.—proving that the supply of heated air furnished on the top of the bed of fuel was even more favourable with coke than with coal. This merely tentative experiment was followed up by a series of experiments made in a laboratory fitted up for the purpose, and in actual use for heating. All these tests show that with the new method of supplying heating air on the top of the fuel instead of cold air underneath, coke (both retort and bye-product) can be made superior fuels to the best anthracite. The author therefore believes that he has achieved something that bore the same relation to coke that the gas-stove bore to gas, and subsequent confirmation has been recently secured.

In kitchen stoves there is a great waste of coal. They also make their full share of smoke. The gas-stove has greatly obviated these fuel wastes; but in millions raw coal continues to be used. The improved coke described, if burned properly, should produce not only greater economy, freedom from smoke, but also higher efficiency, particularly with this new process of combustion. For the homes of the poor and those who cannot afford the luxury of open fires, the author maintains that his process will save fully 50 per cent. in fuel in ordinary stoves.

In his concluding remarks, the author unhesitatingly predicted that, "within five years, the logic of events will bring about such reforms in the use of coal, that England instead of being the most spendthrift of nations—considering her coal supply—will reach the highest economic standard and provide the spectacle of a 'Smokeless London.'"

Discussion.

Dr. J. S. Owens said he had listened with extreme interest to the paper, and particularly to the latter part of it, dealing with the device for improving the combustion of coke or anthracite in closed stoves. He gathered that the device was only applicable to closed stoves and to the combustion of non-smoking fuel. The author had referred to central heating. He (Dr. Owens) thought there was some little question as to whether or not it was an advisable thing. When they heated a building, it was not quite the same thing as heating the people in the building. Going into a building heated with warm air, one sometimes felt quite cold; and he thought the reason was that one lost heat to the walls. Though the air of a building might be perfectly heated, the effect was not at all satisfactory. Anyone standing before a radiating fire got heated up very quickly. Another disadvantage was the drying effect which central heating had on the air. In making comparisons of different means of heating, he should like to know what basis Mr. Schlicht would adopt. He (Dr. Owens) had found some difficulty on this point in his tests for the Smoke Abatement Society. One basis he had adopted was the cost in pence per hour per degree Fahr. rise in temperature of the air of the room. In stoves which had no flue, and in which the products of combustion were passed into the room—flueless gas-stoves—the cost was 0·095d.; with gas-fires which had flues, the cost was a little more, 0·11d.; with coal fires in open grates, the cost was 0·026d.; and with coke fires in the same grates, 0·037d. These figures must be considered as merely approximations. They varied slightly with different grates and different fuels; but they gave a fair idea of the relative costs. It was one of the difficulties of any smokeless fuel that it was to a great extent flameless; and they knew the amount of radiation from a flame was very considerable. If they took away from coke all the volatile matter, hey took away that which would produce a bright flame; and a bright flame did produce a great amount of heat. This was one point that came out in the tests of the Smoke Abatement Society. The fuel that produced the longest flame heated up a room much more quickly than the one that did not produce flame. The new method of combustion was one of the most interesting points in the paper; but it looked contrary to the result that one would expect from the physical point of view. It was perhaps the colder outer surface of the flue that promoted the down draught. With regard to the amount of heat given to the air passing through a room heated by an open fire, he had found that, although the amount of air might be doubled or trebled, it did not reduce the temperature of the room.

Mr. Greville Jones, who was interested in the subject of the paper from the metallurgical point of view, thought Mr. Schlicht had brought before the meeting a problem which, in his opinion, the citizens of London ought to seriously consider. There was no reason at all why all the gas necessary for London should not be produced in the bye-product oven. By doing this, the Companies could get an extraordinary credit from the bye-products in the shape of sulphate of ammonia, benzol, and tar, and all the other things that could be extracted from the gas. Nor was there any reason why coke made in this sort of oven should not be used for household purposes.

Mr. D. A. Louis remarked that the matters dealt with in the paper were by no means unknown to many of those present. In ordinary slow combustion stoves, where breeze or coke or any other slow-burning material was used, every door in the arrangement was shut; and, as a matter of fact, air did pass down the chimney, without any special device at all. That was a very slow process; but it was what was desired. He was once staying at a house where they had a closed stove; and just where the outlet-pipe passed through the wall, it had rusted, and let in air. After this much better results than before were obtained with the stove. That came very near to the author's arrangement.

Dr. H. A. de Vœux referred to the extraordinary difference there was between the atmosphere in London in the early morning and two or three hours later—after the fires were lighted; and he thought it was only a question of chemistry and engineering combined to get rid of the smoke nuisance in London. There was an enormous fortune for anyone who might make a fuel that would burn in an open grate. Englishmen would use the open grate, though many were now also using gas-fires. He had had a closed anthracite stove in his dining-room for the last eight years. It had not cost him more than 2½d. to keep burning for twenty-four hours; but he had not, out of all his friends, had a follower. Sir Charles Cookson had nice coke fires; but they were not so good as coal fires. He did not know whether it was the fault of the grates or the coke, but the people of London did not like coke fires; and he did not think the coke turned out by gas companies was going to be used for open fires. It was only in the last few years that the gas companies had been trying to do something in this way. Years ago he approached one of the largest of the Gas Companies to try to interest them in this matter; but he could not. When he said he wanted a smokeless fuel, they said "burn gas." He hoped gas companies would be driven by force of competition to give the public the new fuel, with advantage to themselves and advantage to the city in which those present lived.

Mr. Schlicht, in reply, said as to the applicability of his process to open grates, bituminous coal could be burned with it, with certain modifications, in an open fire. The descent of the air was due to the fact that a vacuum was produced in the chimney. But the great thing before them was to save fuel and stop smoke. But he did not believe in the use of raw fuel. The tests he had made in the United States had been mainly with anthracite and bye-product coke; the latter being produced by companies who were also supplying gas. The fires were as good as coal fires in London, because all the gas was not taken out of the coal. Domestic coke was being made in eighteen hours; and it contained from 3 to 7 per cent. of volatile matter—chiefly hydrogen and hydrocarbons. Their tests had been made on lines different from those of the Smoke Abatement Society. The process was tested as to the amount of fuel that could be saved. Thermometers were placed in eight different rooms; and readings were taken every fifteen minutes. The results were compared with the results of tests without the device. For open fires, bye-product coke was the coke that gave the best results of any fuel; it being a clean flaming fuel.

The Chairman, in proposing a vote of thanks to Mr. Schlicht, said they had hoped to have had a distinguished expert in the chair that night; but unfortunately he was unable to attend. One point in the paper that struck him (Sir Stewart Bayley) was the rather sanguine expectations which the author put forward, that five years would suffice to convert England to better ways of heating. The paper itself showed that objections to bituminous coal, and attempts to make a decent substitute by coking, began some 250 years ago. They knew in London how far they had got in this matter. Therefore he thought the author's five years would hardly suffice for the regeneration of coal fires. It was, however, quite probable that manufacturers would see the advantages, for industrial purposes, of the system Mr. Schlicht had been suggesting. But in regard to domestic uses, the author had a tremendous prejudice to fight. The line of least resistance was an open grate with an improved fuel in it.

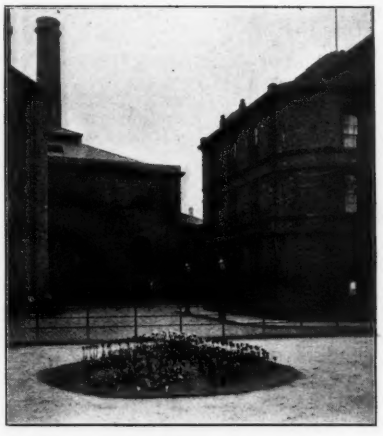
The vote of thanks was heartily accorded.

Mr. Ernest E. Street, of Clifton Park, Bristol, a Director of the West Gloucestershire Water Company, left £32,697.

MANCHESTER AND DISTRICT AND YORKSHIRE JUNIOR GAS ASSOCIATIONS.

Combined Visit to Liverpool.

It may be remembered that the Manchester and District and Yorkshire Junior Gas Associations have for three years past had a joint meeting in the month of May, at which the two Associations assume alternately the *rôle* of host—if such a term is permissible in connection with a visit to works where, of course, both Associations are present as the invited guests of a gas organization and its permanent officials. On Saturday last this joint visit was paid to the Athol Street and Eccles Street works of the Liverpool United Gaslight Company, by the kind permission of



The Offices at the Athol Street Works.

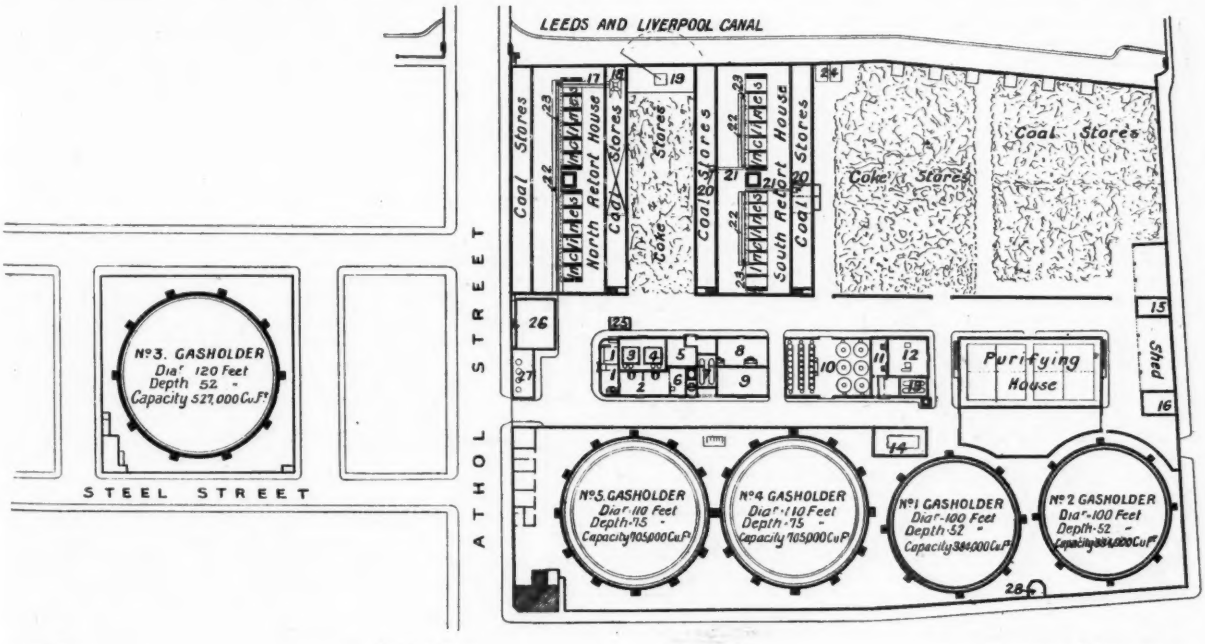
the Chairman and Directors, and of Mr. Edward Allen, the Chief Engineer. Considering the great distances many of the members had to travel, and the early hour at which it was necessary to start, an exceptionally large company—numbering between 100 and 120—assembled. Many members of both Associations made a whole day of the visit to Liverpool; and, as the result of the overtures of Messrs. Bradbury and Hirsch, some 60 visited during the morning the Cunard liner *Ivernia*—the party being conducted to the vessel by Mr. Bennett, one of the firm's staff.

Assembling at the City Hall at 2.30, the party proceeded by special cars to the Athol Street works, where, after a brief speech of welcome from Mr. Allen, under his guidance and that of his son, his Chief Assistant (Mr. Gibson), and the Works Superintendent (Mr. E. Astbury), parties did the round of the two works, which stand near together and are under one Superintendent.

Athol Street Works.

These works were built by the "Oil Gas Company," who, in 1823, obtained an Act of Parliament authorizing them to manufacture and supply gas in Liverpool in competition with the Liverpool Gaslight Company that had been established five years earlier. Subsequently it was found impracticable to make gas from oil in sufficient quantity and at a reasonable price; and a new Act was obtained in 1834, by which the name was changed to the "Liverpool New Gas and Coke Company," and which enabled them to make gas from "coal as well as from oil, and from any other material, liquid, or substance whatsoever." Some years ago this all-comprehensive clause proved of vital importance when Liverpool had to bear the brunt of the first attack against the use of carburetted water gas. Among the first objections brought against it was the assertion that the Liverpool Gas Company were acting entirely *ultra vires* in supplying so objectionable a substitute for coal gas. But by adducing the utterly unexpected terms of the Parliamentary Charter, this count of the indictment was disposed of once for all. The works have been built in a very substantial manner; and though the plant and apparatus have been modified from time to time to meet requirements, the buildings are little changed, though they are not those of the original works.

There are two retort-houses, with coal-stores at either side. Each contains two benches of inclined retorts, of which three have six beds of eights, and one has eight beds of sixes. Each bench will carbonize 62 tons 8 cwt. per day—making the total output 2¾ million cubic feet. Coal is delivered in barges, and, in the case of the north retort-house, is grabbed by a jib crane; but "the man with a barrow" is employed to convey coal from the barges to the stores of the south retort-house. A considerable amount of interest was manifested in the boat-unloading arrangement, which was shown in operation. Eventually the coal, lifted in loads of 15 cwt. at a time, will be dropped into a weighing and automatic recording apparatus similar to that installed at the Eccles Street works. Thence it will drop into a breaker, and by the usual bucket elevator and push-plate conveyor (already in position and in use) pass to the overhead hoppers. Mr. Allen dealt at length with this arrangement, as contrasted with those previously in use there—emphasizing the importance of good weighing and cheap working. Charging operations were seen in process, and certain special features of the house were closely examined. The coke from the fourth tier of retorts is fed into the furnaces by means of a hanging shoot travelling by wheels along rails set the whole length of the house in front of the setting, and some 9 feet above the stage-floor. The remaining coke falls through openings in the floor into the clinkering cellars, which are for their full length open to the yard, where it is stacked after quenching. An additional attachment to the retort-lids on the drawing-stage was promptly seized upon as a subject for questions. This admits of the drawing of a plug and the periodical



1.—Office
2.—Mill-house
3-4.—Station Meter Houses
5.—Stores
6.—Engine
7.—Boilers
8.—Smithy
9.—Mechanics' Shop
10.—Condensers and Scrubbers
11.—Engines
12.—Exhausters
13.—Boilers
14.—"Standard" Washer
15.—Joiners' Shop
16.—Stores
17.—Twin Elevators
18.—Coal-Breaker
19.—Crane
20-21.—Elevators
22-23.—Hoppers and Conveyors
24.—Tar and Ammonia Cisterns
25.—Weighing Machine
26.—Foreman's House
27.—Governor House
28.—Valve House

Plan of the Athol Street Gas-Works.

taking off of the very thick tar that collects at this end of an inclined retort. Casks of it were seen in the yard, and (on the surface at least) it had set to the consistency of soft pitch. Special markets have opened out for this tar, and at these works alone it produces an annual income of about £120.

There are three rows of annular condensers, each containing eight pipes, 3 ft. 6 in. diameter and 24 feet high. The gas is first washed in six cylindrical tower scrubbers, filled with boards, each 10 feet diameter and 18 feet high. These are a survival of the plant of a much earlier time; and while their unusual dimensions caused some comment, attention was called to the very fine and massive castings in them. Cisterns for containing the tar and ammoniacal liquor are built beneath the scrubbers and condensers. There are two sets of exhausters, each of a capacity of 100,000 cubic feet per hour; one being driven by the station steam-engine, and the other by a steam-engine directly coupled. The "Standard" washer is 3 million cubic feet capacity, supplied by Messrs. Kirkham, Hulett, and Chandler.

There are four purifying boxes, each 45 ft. by 24 ft. by 5 ft. 6 in. deep, subdivided to permit of an up-and-down stream. The lids are of the "Green" type, fitted with Milbourne's patent fasteners. The connections are 24-inch pipes with water-seal valves. The boxes stand on an upper floor; and the oxide is revivified on the ground floor. A rope elevator and band conveyor are used for handling the material. The massively timbered roof was here pointed out, and its need attributed to the gear formerly attached to it for lifting the heavy lids of the older-fashioned water-lute purifier-lids. No lime is used; and Mr. Allen, in referring to the paper read to the Wales and Monmouthshire District Institution on the 1st inst., by Mr. Mayne (*ante*, p. 380), pointed out that the device there mentioned, of admitting air for revivification *in situ*, and putting the clean box first instead of last, had been in use for several years in Liverpool, and that in the present instance they had just had a box in use for 7½ months before it needed changing. They admitted the air at the condensers.

There are two station meters of a nominal capacity of 60,000 cubic feet per hour. There are two three-lift gasholders, each of 700,000 cubic feet capacity; two of two lifts, each of 384,000 cubic feet capacity; and one in an adjoining yard of two lifts and 527,000 cubic feet capacity. The governors are four in number, to control the pressure on the street-mains. There are, in addition, the usual boilers, pumps, mortar-mills, and overhead tar and liquor cisterns. A good mechanics' shop, with smithy, is kept fully occupied. The office, containing a photometer-room and laboratory, presents a handsome appearance; and the Superintendent's residence seems of ample accommodation.

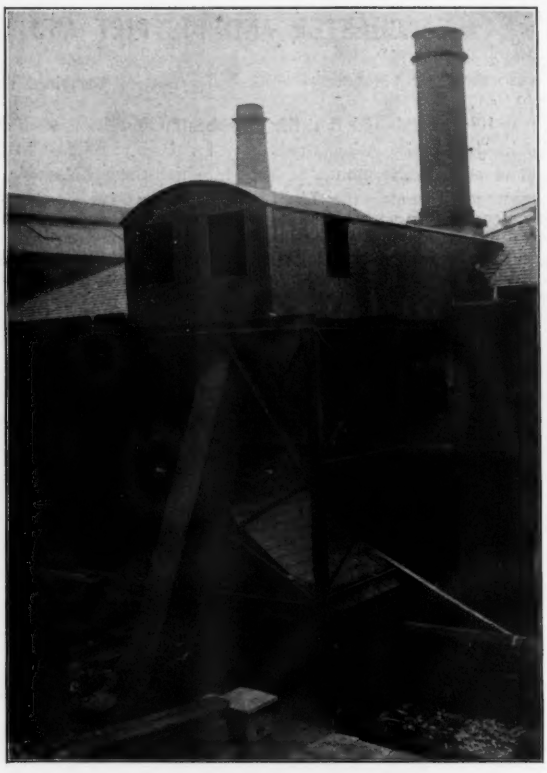
All the gas from these works is sent to the Garston works, where only carburetted water gas is made; and the two gases are there mixed in definite proportions, and delivered to the district.

The visitors then crossed to the

Eccles Street Works.

These works were erected by the original Gas Company, whose operations were commenced on a site at Dale Street (now occupied by the police office) in 1818. Doubtless the advantage of being adjacent to the canal was appreciated, and also the opportunity of laying out works on a larger scale than was possible at Dale Street.

The two retort-houses forming one building are described in the notes on the Fiddes-Aldridge machine,* and remain as originally erected. The total capacity of the three benches will be 2¼ million cubic feet per day. The condensers are of the vertical pipe type, consisting of seventy-two 12-inch cast-iron pipes, 29 feet high, standing in four rows. There are three cast-iron cylindrical scrubbers, 9 feet in diameter, and 16 feet high, fitted with plates and boards. Under the scrubbers and condensers are cisterns to hold tar and liquor.

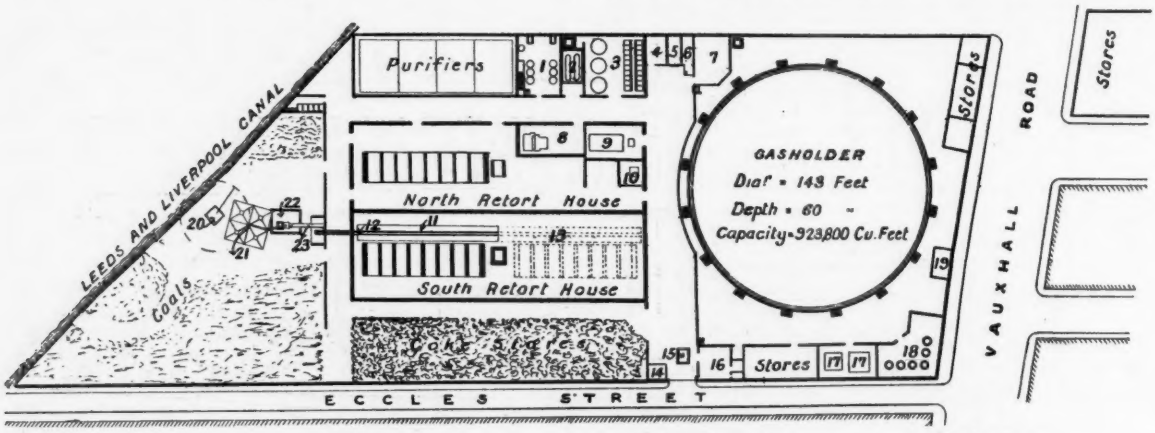


The Elevator and Conveyor at the Eccles Street Works.

There are two sets of exhausters, designed by the late Mr. Alfred King, which are now probably unique. Each set consists of three bells, working in a chamber containing sufficient water to form a seal, and covering the inlet-pipe; the whole being enclosed in a gas-tight casing. A balanced flap-valve is fixed on the top of the inlet-pipe, and another in the top of the bell; so that when the latter is alternately raised and depressed by a connecting-rod attached to the crank of a revolving shaft, the action is as follows: On the up-stroke, gas is sucked out of the inlet-pipe into the bell, and by the same movement gas is expelled from the casing; on the down-stroke, gas is expelled from the bell into the casing. The upper (outlet) portions of the three casings are all connected; and as the three bells are set to move a little while behind each other, the discharge of gas is uninterrupted and tolerably constant in amount.

In addition to the tower scrubbers is a "Standard" washer-scrubber of 2 million cubic feet per day capacity, and one of Messrs. C. and W. Walker's carbonic acid washers arranged as a naphthalene washer by having a layer of carburetted water gas tar-oil floating on the top of the water. At present it is also being used as an extra precaution against sulphuretted hydrogen passing forward into the district—copperas being dissolved in the water. This is necessitated because at present, during the reconstruction of the purifiers, only one box is actually in use for

* See p. 446.



1.—Exhausters and Engines
2.—Boilers
3.—Scrubbers and Condensers
4.—Well
5.—Engine
6.—Boiler
7.—Smithy
8.—Power House
9.—"Standard" Washer
10.—Naphthalene Washer
11.—Conveyor
12.—Hoppers
13.—Projected Extensions
14.—Entrance Gate
15.—Weighing Machine
16.—Office
17.—Station Meters
18.—Governors
19.—Testing Room
20.—Crane
21.—Coal-Hoppers
22.—Coal-Breaker
23.—Elevator

Plan of the Eccles Street Gas-Works.

purification. For the same reason, the make of gas is being kept fairly low. This device of washing for naphthalene had brought down its amount from about 13 to 6 grains per 100 cubic feet, and this had reduced the stopped street lamps from between 2000 and 3000 to from 20 to 30.

The purifiers were formerly four water-luted boxes; but these are being replaced by four boxes, each 30 ft. by 23 ft. by 5 ft. 6 in. deep, fitted with Green's lids and Milbourne's patent fasteners. This work is being carried out by Messrs. Drakes Limited. The alteration will not only enable cheaper and more convenient working, but will increase the capacity by fully 40 per cent. A gravity bucket conveyor is to be used for handling the material, and will be driven by a 4 B.H.P. electric motor.

There is only one gasholder, of two lifts, and 923,000 cubic feet capacity, which replaced the six original ones. Much amused interest was excited by the photographs of these original holders which Mr. Allen well remembered being in existence in his earlier days. They were only 20 feet in diameter, and had three standards joined at the top, so as to make an open equilateral prism-shaped guide-framing. The present trussed holder has exceptionally massive iron columns nearly 40 inches in diameter. The station meters, governors, stores, photometer-room, laboratory, and offices are accommodated in a range of buildings erected at the same time as the gasholder was built.

In these rooms the visitors saw how the Liverpool photometer tests are taken with the gas burning in a batswing burner, and they narrowly scrutinized the self-recording jet photometer, where a continuous photograph of the height of the flame is being taken on a bromide paper attached to a revolving cylinder. A full series of very large drawings of the Fiddes-Aldridge machine was here on view; and in addition to the description given elsewhere, Mr. Allen alluded to the fact that with the Wavertree works original machine the wear and tear had been so slight as quite to discount earlier forecasts of disaster. The chains had rubbed down $\frac{1}{8}$ inch, for which a compensating adjustment was easy; but no sign of rubbing down the retorts or otherwise damaging them had yet been noticed, while the spare chain provided had never been requisitioned. He said he was abundantly satisfied with the performance of the machine, and looked forward to its enjoying a high measure of popularity. He finally emphasized its record of work—viz., 6 cwt. charges, worked off in four hours, and yielding 11,500 cubic feet of gas.

Hospitality of the Directors and Engineer.

By the kindness of Mr. Allen and his Directors, tea was provided on the works for the visitors at the finish of their tour of inspection. At the conclusion of the repast, Mr. Ginman, Mr. Wellens, and Mr. Butterfield voiced the thanks of the visitors to the Chairman and Directors of the Company, to Mr. Allen, and to his assistants who had acted as guides. Hearty testimony was borne to the exceptional interest of what had been seen, to the honour conferred upon the members in being permitted so freely to inspect the works, and to the genial kindliness so abundantly manifested by Mr. Allen in the fulness of his descriptions and in his readiness to answer the many questions put to him.

In responding, Mr. Allen thanked the members on behalf of his Directors, his assistants, and himself, for the warmth and sincerity of their appreciation of what had been arranged for their pleasure and profit. He assured them not only of the promptness of the Chairman's permission for their visit, but of his very real interest in young men, and of his pleasure in the progress of their Associations and what this progress involved and embodied. He (Mr. Allen) had been delighted to have them as visitors, and to give them any help possible. He hoped they would not fail to complete their examination of the works before they left, and secure fuller information on any point of uncertainty. He would speak in the highest terms of their officials, to whom much of the success of the day's arrangements must have been due. He regarded the high success of the day's gathering largely as reflecting the enthusiasm and zeal of the work of the closing session; and he congratulated them upon that work. He would remind them of what most of them would find, even if they had not already realized it, when they reached posts of independent responsibility—that many of their problems were associated with making the most of existing conditions and of old works. It must be very delightful to have the opportunity of constructing entirely new works, of creating one's own conditions of work, and of embodying one's own ideals. But such experiences as those of Mr. Herring at Granton and Mr. Stevenson at Coventry were necessarily very rare; and the members had seen that day how at Liverpool they were dealing with buildings dating from 1820 and 1830, and the conditions of work thereby imposed. Even in connection with the Fiddes-Aldridge machine, many of its earlier arrangements—and to a certain extent the machine itself—had been forced upon them by their surrounding conditions. The members, in their turn, would be faced by similar difficulties and problems arising out of the clash of new methods and old plant, &c.; but these were, after all, among the compensations of the lot of the gas engineer. His work was fresh and interesting. His horizon was not bounded by a few regularly recurring problems, but was varied and ever extending, often unexpectedly; and he could ever have the real satisfaction arising from having manfully grappled with and settled fresh and urgent claims upon his tact, originality, and resourcefulness.

View from the Canal at the Eccles Street Works.

An Honorary Membership for Mr. Allen.

Mr. Holton, the Secretary of the Manchester and District Association, then read a resolution of the Committee nominating Mr. Allen as their first life honorary member, and begging his acceptance of that position. He said that Mr. Allen had done them the honour of signifying his willingness thus formally to identify himself with them; and, to add as much as possible to the dignity of the occasion, they had waited until the whole Association could form themselves into a kind of deputation, to bring the ticket of membership and hand it over in the presence of their friends and colleagues of the Yorkshire Association. They recognized in Mr. Allen a young man's man—one who still felt young at heart, who entered into the young man's feelings and his aspirations, and who could see things from his point of view. He had inspired the enthusiastic devotion of his own young men; and this was

incontrovertible evidence of the truth of what he had claimed for Mr. Allen. They stood before him with the cry of the old Macedonian on their lips: "Come over and help us." He that afternoon extended them very real and much-prized help; and they trusted that he would not hesitate in the future to join in their deliberations, give them the benefit of his extensive knowledge and experience, and pass over to them some of the bright ideas and flashes of insight that came so plentifully to him, in order that they might ponder over them and enlarge their outlook upon their professional work. He begged the President (Mr. Ginman), on their behalf, to hand Mr. Allen his membership ticket.

Mr. Ginman very gracefully, and with well-chosen words, discharged this duty, saying that the Committee and Mr. Allen himself would be glad that so hearty an endorsement of their action had just been signified by the members. He thought Mr. Allen ideally embodied the clause in their rules to the effect that honorary membership could be conferred upon eminent men in the gas profession for special reasons.

In rising to reply, Mr. Allen was greeted with long-continued hearty applause. He confessed to some difficulty in responding, and to feeling considerable emotion in thanking the members for the kindness and warmth of their reception. He deeply appreciated the honour extended to him, though he must disclaim any pretension to the title of "eminent person." He had long been a young man, and had known and been associated with the giants of the profession, and his knowledge of them and the contrast of them with himself made it improper for him to assume any such title. He did wish, however, to be remembered as one who endeavoured to serve his profession, and who was keenly desirous of doing all he could in sympathetic helpfulness for the young men who, in their turn, would be the seniors. In receiving them that day, and in whatever he had been able to arrange and do for them, he was but following in the traditions of his office, and endeavouring as far as he could to do what his venerated predecessor and former chief, Mr. William King, would have done. Mr. King was ever the best of hosts, with a special gift for dealing with visitors, particularly when they were fellow-members of the gas profession, and never happier or more attractively sympathetic than when dealing with young men. He believed that so long as there was an engineer in charge of the Liverpool gas undertakings, the force of his example would be shown in a similar way. He rejoiced to think that their profession was not a whit behind any other in the widespread spirit of untaught spontaneous cordiality among its members. He wished them every success collectively as Associations and in their individual capacities.

REMOVING NAPHTHALENE FROM THE INLETS AND OUTLETS OF GASHOLDERS.

The following is an abstract translation of an article on this subject which appeared in the "Journal für Gasbeleuchtung" of the 4th inst.

It is well known that the naphthalene contained in coal gas is more especially inclined to deposit itself on the walls of the inlet and outlet connections of gasholders, and in particular in the

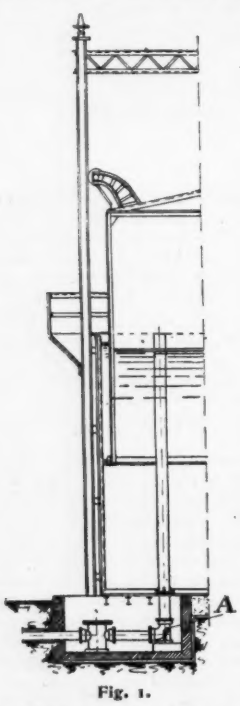


Fig. 1.

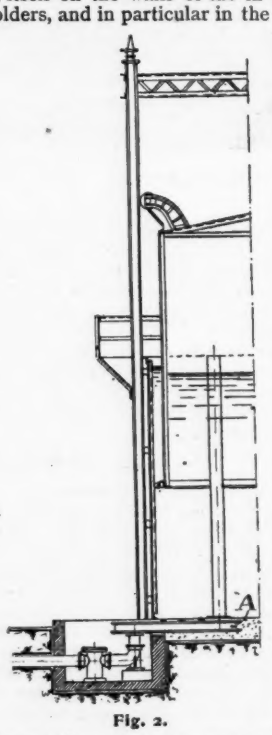


Fig. 2.

vertical pipes which are surrounded by the water in the tank. The thick formation of crystals diminishes the cross section of the connections, and the diminution is gradually marked by loss of pressure. If the crystals are loosened by any of the usual means, they accumulate at the spots in the connections marked A in the annexed figs. 1 and 2, and completely obstruct the passage of the gas. The cause and dependence of such phenomena are not always forthwith apparent; and even when they are, it is always a complex and tedious matter to overcome the trouble.

The accumulations of naphthalene in gasholders can be removed in various ways; but hitherto they have entailed putting the holder out of action for a time—naturally a very great inconvenience, especially in works having only one holder. In order to avoid such interruptions, the Cologne Engineering Company, of Bayenthal, have devised an apparatus which admits of the work being carried out without putting the holder out of use. Two types (both patented in Germany) are made by the Company. They are shown in figs. 3 and 4. In both, short wrought-iron pipes C are riveted to the crown of the gasholder over the inlet and outlet pipes, and are normally closed by a manhole lid.

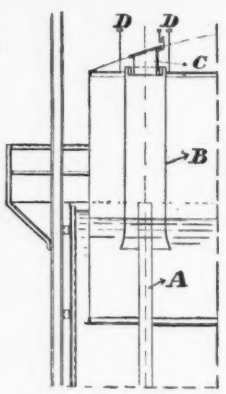


Fig. 3.

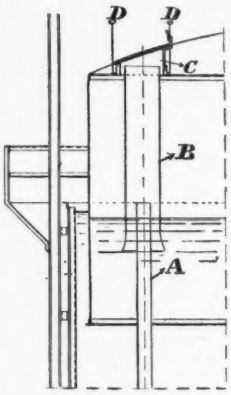


Fig. 4.

In order to shut off the gas-space of the holder, and so make the pipes accessible through the manhole, the pipe B, which is raised and lowered by the apparatus D, is provided. The lower end of the pipe B dips into the water in the tank; and its upper end dips in a water-sealed cup which can be filled and emptied from the crown of the bell. It thus provides direct communication with the pipe A. In the type shown in fig. 3, the sealing cup is on the upper end of the pipe B; but in the type shown in fig. 4, the cup is on the lower end of the pipe C. The first of these is the more usual and convenient type. The pipe B is made from 10 to 13 feet long; so that while the connections are being examined or cleaned, the holder has this amount of play without interfering with operations.

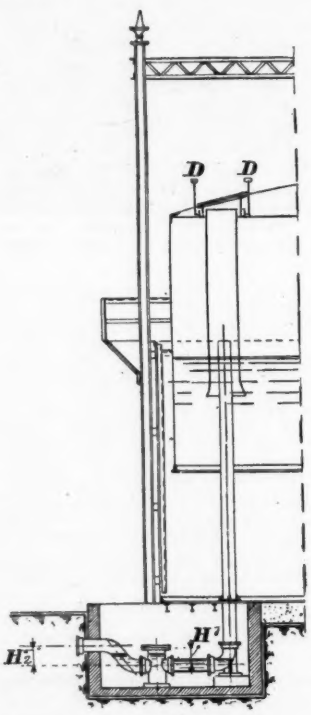


Fig. 5.

If the connections enter the gasholder in the manner shown in fig. 5, the deposits of naphthalene not removed through the upper manhole can be easily removed, during working, through the syphon pot, as will be readily seen from the illustration.

The advantages of the apparatus described are: (1) That the holder may be kept in action during the inspection and cleaning of the mains, and (2) there is no loss of gas, and consequently no danger for the workmen engaged on the operation. The apparatus can be fitted to all existing gasholders without putting them out of action.

WATER-WORKS CONSTRUCTION IN AMERICA.

At the Meeting of the Society of Engineers on Monday last week, a paper on the above subject was read by Mr. ERNEST R. MATTHEWS, Assoc.M.Inst.C.E., Borough Engineer of Bridlington.

The author introduced his subject by explaining that he had been in communication with several American engineers respecting the design and construction of reservoirs, dams, and other water-works in that country, and had received from them much valuable information which formed the basis of his paper.

He first gave a detailed description of the covering-in and improvement of the Natick reservoir, which was designed by Mr. F. L. Fuller, of Boston. Previous to the work being carried out, the reservoir was an open one, and was a source of continual expense for cleansing. At the time of the covering-in, its dimensions were as follows: At top, 217 ft. by 212 ft.; at bottom, 159·8 ft. by 154·3 ft.; area covered, 44,730 square feet; capacity before covering, with a maximum depth of water of 17·22 feet, 4,340,000 gallons. With the same high water, it is now 4,280,000 gallons. In 1902, it was covered in by groined elliptical arches in concrete, at a cost of $9·50 per cubic yard. There are 169 piers, spaced 15·2 feet apart, centre to centre. The elliptical arches have a span of 13 ft. 6 in., and a rise of 2 ft. 9 in., the thickness at the crown being 6 inches. The concrete used was 7 to 1, composed of 1 part cement, 2½ parts sand, and 4½ parts screened gravel. The floor of the reservoir is covered with 4 inches of concrete. The load on the piers is 18 to 19 tons per square foot at the bottom. The total cost was £5894.

The author submitted a tabulated statement relating to the construction of groined arches in connection with reservoirs and filters in America, prepared by Mr. Leonard Metcalf, of Boston, U.S.A., and then described a small covered reservoir at Franklin, also designed by Mr. Fuller. It is circular, 46 feet in diameter, allowing a depth of water of 20 feet, and having a capacity of 248,600 gallons. The wall is 3·5 feet thick at the bottom, 2·5 feet at the top, and 22 feet high. It is built in concrete, composed of 1 part cement, 2 parts clean sharp sand, and 4½ parts screened gravel. The roof is 10 inches thick at the springing, and 8 inches at the centre, and has a rise of 4·6 feet. To resist the thrust of the roof, a steel band, 14⅓ inches wide and 1 inch thick, was inserted near the top of the concrete wall. The bottom of the reservoir consists of 6 inches of cement concrete. An electrical indicator shows at the pumping-station the elevation of the water in the reservoir.

The author next described a covered reservoir at Louisville, which he said was a good example of a modern American reservoir constructed throughout in reinforced concrete. The roof is of the groined arch type; the arches being approximately 19 feet span and 3·8 feet rise. The thickness of concrete at the crown is 6 inches, and above the piers 3 feet. The reservoir measures 460 feet by 392 feet; and it has a capacity of 25 million gallons. The piers are 3·4 feet in diameter, and 21·11 feet in height, and are placed 22 feet apart, centre to centre. The material used was portland cement concrete, 6 to 1. Some particulars were also given of a covered reservoir at Rockford, measuring 156·56 feet by 66·26 feet. The roof only is of reinforced concrete; the remainder of the reservoir being in ordinary concrete. The roof is a ribbed arch. The ribs increase in depth from the crown to the haunches, and are 7 feet apart. The reservoir is constructed in 7 to 1 concrete, and the cost was $18,506.

Mr. Matthews next proceeded to describe a low-buttress dam at Theresa, which was carried out in reinforced concrete—being a new departure in dam construction. It was designed by Messrs. Ambursan and Sayles, of Watertown. It is 120 feet long and 11 feet high, and has a foundation on the solid rock. It consists of a concrete slope supported by concrete buttresses, the former being 6 inches and the latter 12 inches in thickness, and the buttresses being placed 6 feet apart, centre to centre. The whole is reinforced by ¾-inch Thacher steel rods and expanded metal. The buttresses and toe are of 9 to 1 portland cement concrete, and each buttress is bolted down to the rock by 1¼-inch bolts, 3 feet in length.

The author concluded by referring to a special high-pressure fire-service main which has been laid in the City of Providence, the leading features of which are the design of the joints, the method of securing the pipes laid on the curve, and also the branch pipes.

The Late Mr. Young's Estate.

The late William Young, of Peebles, whose bequest of his Harehope Estate to the Town Council, for the purposes of a sanatorium for consumptives, was mentioned in the "JOURNAL" last week, left personal property of the value of £23,007, of which £12,000 is the worth of that given to the town.

REGISTER OF PATENTS.

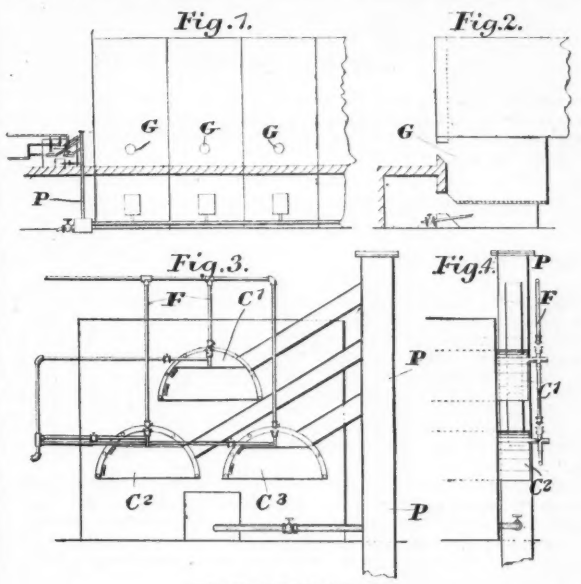
Burning Tar and Like Fuel in Furnaces.

BALLARD, S., of Worcester.

No. 1559; Jan. 20, 1906.

This invention—of "improvements in the mode and means of burning fuel"—is particularly applicable for use in connection with gas-retort furnaces, "in which the particular arrangement of known apparatus and the provision of new details for feeding and injecting the tar will be of considerable advantage."

A heated secondary chamber or retort is used, into which the tar is fed and volatilized or vaporized. The gas or vapor formed is fed to the underside of the fire-grate, or into a combustion chamber, subsequently passing up through it and burning alone or with other fuel.



Ballard's Tar-Fuel Furnace.

Fig. 1 shows diagrammatically the invention applied to a retort-furnace. Fig. 2 shows the way the tar gas is passed under the grate. Fig. 3 is a front elevation of the tar volatilizing chamber. Fig. 4 is a part side view of same.

The gas-retorts are provided with firing holes G, under the grates of which the tar gas is to be fed. For the purpose of volatilizing the tar, there is a secondary chamber comprising a nest of three retorts C^1, C^2, C^3, and a fire-place below. The retort fronts are made in two parts—an upper part which carries the tar-feeds F, and a lower part, which is hinged so as to allow the carbon and tar residue deposited in the retort to be clinkered out. The tar-feeds have injectors into which steam-pipes lead, and which injectors are arranged with their tundish portions immediately below the tar leading pipes. The tar is led along these pipes into the tundishes of the injectors, through which it is drawn, with some air, by the steam blowing through the steam-pipe into the retorts. Under the influence of the heat of the retorts the tar is volatilized; the resulting gas being led off from the retorts by pipes into a vertical header or main P. This main leads down preferably to a chamber or trap in which any free tar present in the gas would settle—the chamber being provided with a tap for running off the tar. The main then leads to the ash pits of the gas-retorts, and is distributed through an open-ended pipe cut under so that it is impossible for ashes to fall in. The outlet is led off the main P in the ash pit; being connected thereto by a full-way valve, so that the gas may be entirely cut off when desired, as when clinkering. The gas mixes below the grate with the primary air, and, passing up through the fire, is burnt—"the firing of the retorts being carried on in the usual way, except that the gas takes the place of a great portion of the fuel, and the more gas used the less fuel is necessary to be put on the fire."

Flash-Light Cocks for High-Pressure Gas Lighting.

SUGG, W. (the late), of Regency Street, Westminster.

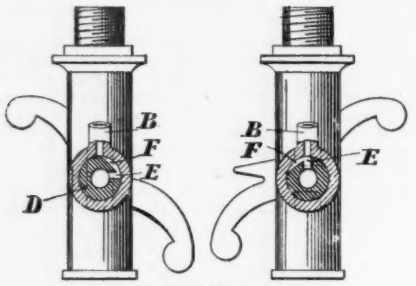
No. 9105; April 17, 1906.

In burners used in high-pressure gas lighting which are also furnished with a flash light or pilot flame, it is desirable, the patentee remarked, to make some provision for reducing the gas supply to the pilot flame when the burner is alight and the pressure of gas is fully on; otherwise there is an unduly long flame all the while the burner is at work, and a much shorter one (perhaps too short) when the gas to the burner is cut off.

To curtail the supply of gas to the flash light when the burner is at work and the pressure is on, and to furnish a sufficient supply to the flash light when the burner is out and the pressure of gas is reduced by the stoppage of the motor, was the object of the inventor. In this way, the flash light, which is not intended to go entirely out, does not in the one case, when the pressure is high, waste gas by an unduly long flame, or, in the other case, become inoperative and likely to go out by reason of feebleness when the pressure is low.

The illustration (p. 462) shows two positions of a cock embodying the invention in simple form. The plug has a through passage D for the gas when full on, and a small passage E for the pilot light opening into

a notch F. When the passage D (shown dotted) is in line with the burner, the point of the notch F is brought into line with the tube B, so that only a small supply of gas from the passage E finds its way to the pilot light when the burner is alight and the gas full on. On the gas being turned off from the burner and full on to the pilot light, the



Sugg's Flash-Light Cock.

passage E in the plug is in line with the pipe B. Increasing the pressure of the gas before the burner is turned on will then lengthen the flash light momentarily for ignition purposes before the gas supply to the pipe B is finally reduced.

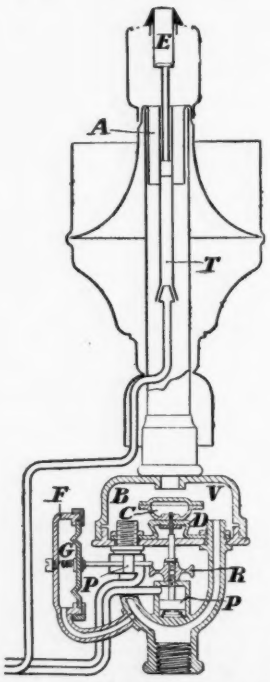
Lighting and Extinguishing Gas-Lamps.

RYLSKI, B., and CORNU, P., of Paris.

No. 10,564; May 5, 1906. Date claimed under International Convention, May 16, 1905.

This apparatus is designed to light the burner at the same time that the gas is turned on, and to accomplish it at the centre of the flame immediately on the exit of the gas, thus avoiding explosions, and, as a result, the destruction of the incandescent mantles; further, to carry out the operation of turning on and off the gas at any distance from the burner, while permitting the regulation of the opening of the burner; and, further still, to turn off or close the gas at the burner when the gas is turned off at the meter—"thus avoiding possible serious accidents and at the same time simplifying the operation of turning off the gas."

The operations are effected either by compressed air operating on pistons by means of any suitable compressor—such, for instance, as a rubber ball; by the compression of a liquid filling elastic reservoirs, operating like a pair of bellows, or like two pumps communicating with each other so that when one of them is compressed or dilated the face of the other is correspondingly advanced or receded; or the operation may be carried out by means of electricity by replacing the pistons with electro-magnets. The lighting always takes place at the centre of the flame by means of black platinum and of very fine filaments of platinum.



Rylski and Cornu's Lamp Lighter and Extinguisher.

The apparatus is composed of three parts: 1. The gas-gate V. 2. The automatic closing device F. 3. The lighting arrangement in the centre of the flame A.

The gate comprises a chamber B into which the gas passes by two U-shaped pipes. On the top of the box is an opening for the exit of the gas. The valve or clapper is formed of a thin sheet of rubber fixed on a small metal cup C, itself fixed to a metal rod freely traversing the bottom of the chamber B, which, however, guides the rod in its movements upwards or downwards, and prevents it turning upon itself.

Under the cup (which is filled with glycerine and secured against it by a nut) another mushroom-shaped and very elastic sheet of rubber D, traversed by the two branches of the U-shaped pipe and fixed by a metal ring or washer on the bottom of the box or chamber, ensures the staunchness of the box while permitting the very free play necessary to working. Between the branches of the pipe through which the gas arrives, an air piston P is fitted, on the lower side of which is a spring, which maintains the valve against the gas outlet to close it—the spring being calculated so that the pressure is sufficient to close the orifice.

Between the valve-rod and the air-piston rod is mounted a nut R, for regulating the escape of the gas. It is fixed on the rod by a screw, and receives, by means of a screw fitting freely in the nut, the end of the valve-rod. By rotating the nut the valve rises, and thus reduces at will the orifice for the outlet of the gas to the flame—a flange on the rod preventing (by engaging the bottom of the box) greater pressure than is necessary on the exit orifice when it is closed.

The automatic closing apparatus consists of a box G closed at one side by a sheet of rubber, at the centre of which is fixed the rod of an air piston mounted on one of the branches of the U-pipe. The extension of this rod at the other side of the piston is formed with a blunt point forming a catch, which remains at the side of the regulating nut R when the apparatus is closed, and passes above the nut at the moment of opening. This box receives the gas by a pipe from one of the branches of the U-tube.

When the meter is turned on, the gas arriving in the box G pushes the rubber sheet, and the blunt point forming the catch is pushed forward and comes against the side of the regulating nut R. If the air is then compressed, the piston of the valve lowers and allows the passage of the gas to the burner—the blunt point passing above the regulating nut R and maintaining the apparatus open. To close the apparatus without turning off the meter, it is only necessary to cause air pressure to be exerted on the closing piston P. This pressure, being stronger than the pressure of the gas, the piston recedes and disengages the regulating nut of the rod, and the spring operating the valve remounts and closes the gas outlet. The apparatus being open, if the meter is turned off, the pressure becomes *nil*. The spring of the closing box automatically draws in the rubber sheet and with it the piston P, disengages the regulating nut R, and the closing takes place as before.

The lighting apparatus consists of an air-piston placed in the centre of the gas inlet to the burner. It is connected to the mantle supporting apparatus by a tube provided with wings, which maintain the piston so as to fit exactly in the gas inlet. The piston is continued by a rod traversing freely the bottom of a cylinder E placed in the upper part of the burner; the rod carrying a small plate, on which may be fixed (say) black platinum. The tube T, at its lower end, is extended in funnel form, and rests on the top of the air-inlet tube, which is of musbroom form. The air-inlet tubes are united in such a manner that the same transmission of air acts on the opening piston P and on the lighting piston, and this is said to "resolve the problem of simultaneous opening and lighting." When the air pressure is created, the lighting piston rises and presents its lighting device at the mouth of the burner; the platinum reddens; and lighting takes place without explosion or shock. When the pressure ceases, the piston descends by its own weight; the lighting device lodges in the cylinder E (where it is away from the gas); and the flame is thus protected.

Gas-Turbines.

HOLZWARTH, H., of Hamilton, Ohio, U.S.A., and JUNGHANS, E., of Wurtemberg, Germany.

No. 20,546; Sept. 15, 1906.

This invention relates to gas-turbines wherein air and gas, separately compressed, are fed to the chambers of a revolver, from which they pass successively in regulatable quantities into explosion chambers closed by weighted valves, and in which they are ignited. Thereupon the expanded products of explosion, after exceeding a certain pressure, automatically open the valves and flow through nozzles to impinge against the vanes of the turbine. The adjustable feed to the explosion chambers is effected by means of a revolver having air and gas chambers, and operated at a regulatable speed by a motor.

Incandescent Gas-Burners.

BRAY, J. W., of Leeds.

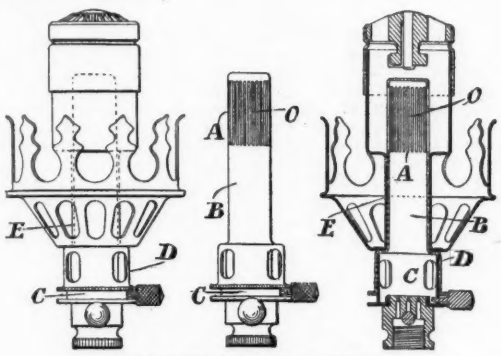
No. 1619; Jan. 22, 1907.

This invention in incandescent burners has for its object the construction of a burner of the "C" type, which may be "readily adapted to any conditions of flame—such as 'fierce,' 'flabby,' or otherwise—and which is not liable to be rendered inefficient by particles of mantle falling through the burner-head, or by the corrosion of wire gauze, and through which a large quantity of gas and air mixture may be passed, if desired."

The gas-nipple projects slightly into a chamber C (p. 463) provided with holes for the admission of air, and an air-adjusting device or sleeve D. The chamber may form a portion of the bunsen tube, though in the form shown the tube B is provided with the air-adjusting device D at its base—such tube fitting, by preference, over the chamber, as hereafter described. Leading from the chamber is the bunsen tube B and mixing-chamber A, which comprises a tube with substantially parallel walls, closed at the top, but provided with slits or orifices O of convenient number, width, or shape.

The tube B passes into an outer casing E, terminating in an enlarged annular chamber open at the top, on or into which fits the burner-head. Any particles of mantle falling through the burner-head fall to the base of this annular chamber, and not on to the orifices or slits in the tube. Should, however, dust or the like pass upwards through the air holes in the base of the bunsen tube, the slits may be cleansed by lifting the gallery and burner-head upwards, and simply blowing through them. By constructing the orifices with substantially parallel walls, the patentee claims "to obtain the maximum area of apertures for the passage of the gas and air mixture in the minimum amount of space, and, further, an almost perfect mixture of gas and air is obtained, owing to the baffling action of the perforated tube and the eddies set

up in the annular chamber." Further, the burner is said to be free from "lighting back" troubles.



Bray's Vertical Incandescent Burner.

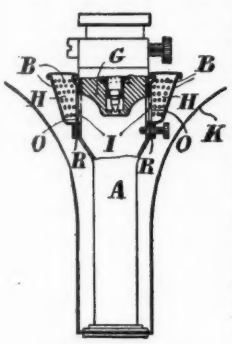
In order that the gallery, burner, and mantle and chimney may be lifted from a fitting in which a short lift is only permissible, the air-adjusting device D on the bunsen tube is provided with an out-turned flange, and the chamber C with a similar flange; and between these flanges is inserted a screw with an enlarged head, whereby the flanges may be held. Thus the lift required to remove the burner from the fitting is only the depth of the chamber C, and not the length of the bunsen tube.

Air Regulation and Preventing the Flashing-Back of Inverted Gas-Burners.

GRAETZ, M., of Berlin.

No. 26,832; Nov. 26, 1906.

The regulation of the air supply and the prevention of the flashing-back of the flame of incandescent gas-lamps is accomplished, according to this invention, by placing a cylindrical ring provided with air holes over the burner-pipe and attaching a sieve to this ring of such construction that it forms a hollow space between the outer sieve and the ring which rotates on the burner-pipe, and by means of which the inner pipe, as well as the air-duct, are kept free of obstruction.



Another Form of the Graetzin Lamp-Burner.

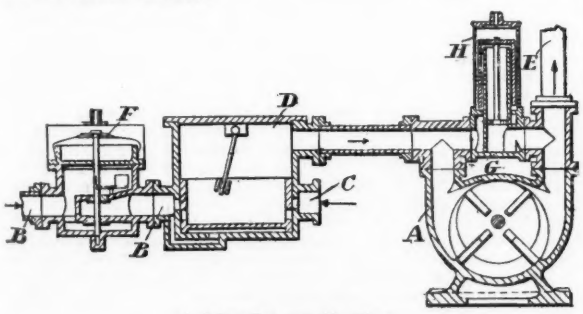
In the arrangement shown of an inverted incandescent gas-lamp, A represents the burner-pipe provided with air-ducts I, over which a cylindrical ring R slides; the latter also being provided with air-ducts O and capable of being turned on the pipe A. To the ring R the sieve B is attached; its construction being such that a hollow space H is formed between the outer sieve and the inner ring, which is of conical shape. The upper or the lower bottom of this hollow space H may be perforated, if desired. G represents the gas inlet. As the whole arrangement is attached to the upper part of the lamp, it has to be protected against the radiating heat and combustion gases ascending from below, which purpose is achieved by the bell-shaped shield K.

Gas and Air Mixing Apparatus.

AKTIENGESELLSCHAFT FÜR SELAS-BELEUCHTUNG, of Berlin.

No. 3303; Feb. 9, 1907. Date claimed under International Convention, Feb. 22, 1906.

This invention relates to apparatus for producing a mixture of gas and air, with regulation of the supply by the suction pressure of suction and forcing apparatus. The slide valve employed regulates the inlets for gas and air, and likewise serves as the operating piston, subjected to the influence of the suction pressure, owing to the fact that the admission to the piston cavity takes place through the shell of the hollow piston or through passages in the shell of the piston opening into the suction chamber.



A Selas Gas and Air Mixer.

A continuously rotating forwarding apparatus A is employed to suck gas at B and air at C. From the chamber D the mixture is forwarded to the pressure pipe E, to which service-pipes, with burners or the like, are fitted in any desired manner. Before entering the chamber D, the gas flows through a regulator F of known construction. A so-called circulation pipe G, uniting the suction and pressure pipes, is provided with a regulating device H, whose obturating slide valve, co-operating with discharge apertures, is adjustable under the influence of the forwarding pressure in such a manner that, in case of excess pressure, the suction and forcing apparatus is able to suck the mixture back from the forwarding pipe.

In the mixing-chamber D, a piston slide valve is arranged, formed as a hollow piston, in the shell of which admission apertures are formed—one in front of the gas admission aperture and the other in front of the air admission aperture. At the bottom of the mixing-chamber a pipe branched off the pipe B opens, so that the gas is able to enter beneath the piston and cause it to ascend. When the apparatus is started, the gas flowing out of the pipe B, on the one hand, and the vacuum produced in the suction chamber D, on the other hand, cause the piston slide valve to rise, and open the admission apertures; so that suction of gas and air in a normal manner can take place. Alterations in the suction pressure cause corresponding alteration in the height of the piston slide valve in such a manner that, with an increased pressure in the suction pipe, the cross-sections for gas and air are diminished in size, while with a falling pressure they are enlarged, until the normal pressure corresponding to equilibrium is re-established.

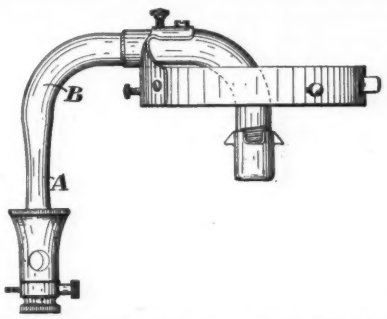
Inverted Incandescent Gas-Burners.

BRAY, A., of Leeds.

No. 4202; Feb. 20, 1907.

This invention relates more particularly to that type of burner wherein the bunsen tube is provided with a joint whereby the burner may be reversed in order to fit either an up-turned or down-turned fitting—such as is described in patent No. 19,395 of 1905. It has for its object "the arrangement and construction of the bent or curved bunsen tube in such a manner that a better flame, and therefore increased light, is obtained."

The improvement broadly consists in the formation of the bunsen tube as a "Venturian tube" having a preferably free passage—that is, unobstructed by perforated cones, or the like—though wire gauze may be placed in the tube, if desired. Such gauze will, however, the patentee points out, "tend to decrease the efficiency of the burner, owing to the same becoming, in time, blocked up by dust particles."



Bray's Inverted Burner with "Venturi" Tube.

The bunsen tube B, instead of being of substantially one diameter throughout, is formed in its lower portion in the shape of a Venturian tube—that is, somewhat restricted—as shown at A. Preferably there are no obstructions in the tube from the gas-nipple to the burner-mouth. The tube may be provided with an intermediate joint, as described in the earlier patent named; and the gas-nipple may have a "Bray" regulating screw to enhance "the efficiency of the burner, owing to such use enabling the burner to be readily adapted to varying pressures." In this way it is claimed that the resulting flame at the burner-mouth is sufficient to completely fill not only an ordinary sized mantle, but one of considerably larger dimensions.

APPLICATIONS FOR LETTERS PATENT.

9889.—LIEBISCH, R. J., "Gas-regulating nipple." April 29.
9912-3.—HAWKINS, G. E., "Recording the readings of meters." April 29.
9916.—SCHMIDT, C. R., "Pipe-couplings." April 29.
9943.—LEGGE, J. ST. C., "Gas-lamps." April 29.
9966.—THIL, A. H. DU, "Gas-producer." April 29.
9973.—M'LEAN, J. H., PHELPS, F., and RAYBOULD, A., "Inverted burners." April 30.
9985.—SELFE, J. M., "Gas-register." April 30.
10,006.—PENDRILL, A. T., "Switch gas-lighter." April 30.
10,199.—PRIDEAUX, S. H. & F. F., "Pipe-couplings," May 2.
10,201-2.—STEEL, M., JUN., "Carburetting apparatus for producing gas." May 2.
10,215.—CAME, L. A., "Locking gas-cocks." May 2.
10,226.—BORMANN, J. G. L., "Gas-generators." May 2.
10,237.—HIMMEL, G., "Lighting gas-lamps from a distance." May 2.
10,294.—KEITH, J., "Lighting arrangement for incandescent gas-burners." May 3.
10,297.—MILNE, J., "Gas pressure-gauges." May 3.
10,305.—DUNNACHIE, W. J., "Manufacture and recovery of ammonia and improving the quality of the tar in the gases of blast and other furnaces, retorts, coke-ovens, and the like." May 3.
10,320.—ANDERSON, D., "Inverted burners." May 3.
10,346.—TULLY, C. B., "Production of gas." May 3.
10,393.—SYKES, F. C., "Gas-leak indicators." May 4.
10,395.—COX, G. J., "Securing cash-boxes of coin-freed apparatus." May 4.

Owing to the introduction of the incandescent system, the cost of the gas supplied to the public baths of Kensington has fallen from £248 10s. 8d. for 1903 to £157 8s. 6d. for the past year.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Victoria Forced Draught Furnace at Croydon.

SIR,—I have lately received from several engineers inquiries as to the results we have obtained from the forced draught furnace supplied by the Victoria Furnace Company, Limited. These inquiries refer to a circular lately issued by the firm which contains what purports to be a testimonial given by me in the following words: "These are the best furnaces we have used." I think it only fair to myself and to the makers of similar furnaces to state that I have not made any such statement, nor have I given the firm any written testimonial whatever. I may add that the manager of the firm in question acknowledges that the statement referred to was based upon his interpretation of a conversation he had with me on the subject of his furnaces some time ago.

I need not say that I shall be pleased to give my opinion as to the merits of the furnace to any engineer who is considering its adoption.

Croydon, May 10, 1907. J. W. HELPS.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Brighouse Corporation Bill, Shanklin Gas Bill.

Bills read a second time and committed: Brockenhurst Gas Bill, Grays and Tilbury Gas Bill.

Bills reported, with amendments: St. Neot's Urban District Council Bill, Tynemouth Corporation (Water) Bill.

Bills read the third time and passed: Falmouth Gas Bill, Great Yarmouth Water-Works and Lowestoft Water and Gas Bill, Mitcham and Wimbledon District Gas Bill, Selsey Water Bill, Southport, Birkdale, and West Lancashire Water Board Bill, Tees Valley Water (Consolidation) Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill brought from the Lords, read the first time, and referred to the Examiners: Tees Valley Water (Consolidation) Bill.

Bills reported, with amendments: King's Norton and Northfield Urban District Council Bill, Leeds Corporation Bill, Penrith Urban District Council Bill.

The South Essex Water Company have presented a petition against the Southend Water Bill [Lords], which has been referred to a Select Committee, consisting of Mr. Nussey (Chairman), Mr. Morrell, Mr. J. S. Fletcher, and Mr. Charles MacVeigh; to commence sitting on the 28th inst.

METROPOLITAN WATER BOARD (CHARGES, &c.) BILL.

(*Before Viscount* CROSS, *Chairman, the Marquis of* WINCHESTER, *Earl* MANVERS, *Lord* ABERDARE, *Viscount* RIDLEY, *Sir* J. RANDLES, *Mr.* ROSE, *Mr.* WHITBREAD, *Mr.* DUNCAN, *and Mr.* LUKE WHITE.)

The Joint Committee of the Houses of Lords and Commons to whom have been referred the above-named Bill and the Board's Various Powers Bill held their first sitting on Thursday, the 2nd inst.

The Hon. J. D. FITZGERALD, K.C., Mr. HONORATUS LLOYD, K.C., Mr. COURTHOPE MUNROE, and the Hon. E. CHARTERIS were Counsel for the Bill, against which there were a large number of petitioners.

Mr. FITZGERALD said there were two Bills to come before the Committee—the Charges Bill and the Various Powers Bill; but the substantial question arose on the first Bill. The second was of a more or less ordinary character.

The Committee then adjourned till the following Tuesday, when the promoters' case on the Charges Bill was opened.

Mr. FITZGERALD said the Bill was promoted by the Metropolitan Water Board to provide for uniform scales of charges for water throughout their limits of supply; and it had been introduced in fulfilment of a statutory obligation imposed upon them by section 15 of the Metropolis Water Act, 1902. Sub-section 6 was as follows: "The Water Board shall not, until Parliament otherwise determine, reduce the rates charged for the supply of water below those in force during the quarter ending the 24th day of June, 1902, unless the Board are satisfied that such a reduction would not cause a deficiency in the water fund; but the Water Board shall, within three years after the appointed day, introduce into Parliament a Bill providing for uniform scales of charges applicable throughout the limits of supply." The appointed day was June 24, 1904; and therefore the Board were obliged to introduce the Bill this year. Before the water supply was taken over by the Board, the charges in the different districts were leviable by Special Acts, and varied in each district. He had shown the Committee that the Board, in considering what the new uniform scale was to be, had to regard the provision that it was necessary that the Board should maintain their income. This at present was only sufficient to enable them to pay their way; and accordingly it was incumbent upon them to see that the equalization of the charges was not carried out at the expense of the ratepayers. Equalization would necessarily mean that some persons would pay more and others less for their water than formerly. After the fullest consideration, the Board came to the conclusion that it was desirable to abolish the extra charges connected with the water supply, which were of an irritating character. As a question of policy, it seemed to be open to objection to put on an extra charge which might limit the use of water-closets and baths, which was very undesirable. Then, again, there was the charge made for the high service, which was peculiar to London; and it was very difficult to give any satisfactory reason for it. Not only were the extra charges in themselves open to objection, but there was considerable inequality in the manner of their imposition; and in some cases they raised the rate to as much as 9 per cent. on the annual value of the premises supplied. The income derived from extra charges in the year 1905 was £300,000; and any scheme of uniform charges must return to the Board this amount in respect of what they would lose by the abolition of the additional charges. They had come to the conclusion to propose to Parliament a uniform rate of 5 per cent. on the annual value of the premises, which would include all charges that were formerly extras. This uniform rate of 5 per cent. would produce nearly, but not quite, the present income from both sources. In 1905, the income from the domestic supply, including the extra charges, was £1,832,772; and a uniform rate would have produced £1,811,149—showing a deficiency of £21,623. The rate proposed was not a fixed one; but the maximum. The Corporation of the City of London objected that all water should be paid for by measure, and not by a charge on the rateable value of the premises. Such a proposal would involve a large loss of income now received by the Board, and it would have to be made up by an increased charge on premises of smaller value in other portions of the limits of supply. No such provision could be confined to the City. There was no reason why a bank in the City should be assessed differently from one in Westminster or in any other part of the Metropolis; and if they once had a special charge or a special exemption of this kind, it almost followed that it must be made applicable throughout the whole area. At the present time the water-rates in the Administrative County of London were assessed on the rateable value; but where the district extended beyond the county, they were assessed on the annual value. It would obviously be convenient and advantageous to take the rateable value outside as well as inside London as the basis of the new uniform charge. To do this would involve a loss of £10,618 in the income of the Board. The London County Council objected to this provision in the Bill, on the ground that it would be unfair to the ratepayers inside London; and apparently they were under the impression that it would cause a heavier charge to be levied upon them. This was not so. So long as the Board could pay their way, it made no difference to a consumer of water inside London whether the rate outside was charged on the annual or the rateable value. Whichever way it was charged outside, the ratepayer inside would pay on the basis of rateable value. In simple justice to the greater portion of the district, it was necessary to make the alteration; and he hoped the Council would not persist in their opposition. The next matter dealt with by the Bill was that of the trade supply. The general practice of Parliament had been this: Whereas they had fixed rates throughout the country for a domestic supply, as a rule they had not done so for a non-domestic supply, nor had they put any obligation on either the local authority or the water companies to furnish a supply for other than domestic purposes. They had left the charge for it to be fixed by agreement. The New River Company were obliged to furnish a trade supply to any consumer who was taking their water for domestic purposes; and the rate varied from 7½d. down to 6d. per 1000 gallons, with an additional charge of 25 per cent. if the water was supplied at an elevation of more than 60 feet above Trinity high-water mark. The Board proposed to make general throughout London the obligation which was now imposed upon them in regard to the New River district; and they would be obliged to give a supply for trade purposes to any consumer who was entitled to a domestic supply. They also suggested in the Bill that the maximum charge should be 1s. per 1000 gallons. But they did not propose by the Bill to fix a scale of charges; they would be able from time to time to fix one within the maximum stated. They expected an additional revenue of £52,699 from this source. The next matter was the supply of water for flushing the sewers and drains, for cleansing and watering the streets, and for supplying any pumps, baths, or wash-houses. In the time of the Water Companies, objection was taken by two Local Authorities to the scale of charges for these purposes under section 37 of the Water-Works Clauses Act, 1847; and it was finally settled that 6d. per 1000 gallons should be paid. This was not a remunerative rate, and was less than the average cost of the water. Accordingly, the Board proposed to make the charge 6d. per 1000 gallons, but they added: "For the purposes of this section, the said section 37 shall be construed as extending to all such purposes as are therein mentioned, whether the expenses in connection with such purposes be defrayed out of poor rates or borough rates or out of any other public rates." The effect of this was to make the provision applicable to all cases within the limits of supply. Some of the authorities were asking that it should be made applicable not only to the cases mentioned in the Act of 1847, but to a variety of others—such as water supplied for public parks. The Board could not consent to this, for the reason that 6d. per 1000 gallons was not a remunerative rate. There was at present no definition of the term "domestic purposes;" and in clause 20 of the Bill the Board made provision that "in and for the purposes of this Act, the expression 'domestic purposes' shall be deemed to include water-closets and baths constructed or fitted so as not to be capable of containing when filled more than 80 gallons." It was not to include a supply of water for some purposes, which were specified, and which were clearly not "domestic." On the Bishop of London's Paddington estate, occupiers of houses were charged 15 per cent. less than those in the adjoining district. The Board had come to the conclusion that there was no reason for continuing this special exemption. Turning to the financial result of the proposals, Counsel said that in 1905 the Board's total revenue was £2,740,064. Had there been a uniform rate of 5 per cent., this would have been increased to £2,752,445, or an increase of £12,391. But the proposal for the adoption of rateable value as the basis would reduce the £12,391 to £1773; so that, under the Bill, there would be produced about the same revenue as at the present time. Counsel concluded by dealing with some of the petitions presented against the Bill.

Mr. *A. B. Pilling*, the Clerk to the Board, gave evidence bearing out Counsel's statement, and the Committee adjourned.

On Wednesday, the witness was cross-examined by Sir R. LITTLER with a view to showing that the proposed mode of charging in the City would be inequitable. He put several hypothetical questions, one being: If the persons employed on premises rated at £2000 a year numbered 50, the charge would be £2 a head, and each of them would only use 1900 gallons of water a year. Witness replied that the charge might be £2 per head; but he could not take the figure of 1900 gallons a year. Counsel then put the case of the typical dwelling-house, with an average of about six occupiers, and rated at £30, and gave figures to show that the amount paid in this case would be 30s. a year, or less than 4d. per 1000 gallons. The Chairman remarked that it was all a question of argument, and not of fact. Counsel said he quite admitted that it was a matter of argument; but he did not want to have it said that he was on a wrong basis. The witness was next cross-examined by Mr. Blennerhassett, on behalf of the London County Council, as to the difference between the incidence of the charges in the inner and the outer areas.

The evidence of Mr. Pilling was concluded on Thursday, and Mr. Honoratus Lloyd then announced that the Board were so satisfied with the full way in which Mr. Pilling had gone into the matter, that they only proposed to call the Comptroller (Mr. F. E. Harris) in order to prove formally the figures in the table they had put in, and the Chief Engineer (Mr. W. B. Bryan, M.Inst.C.E.) to answer just two or three engineering questions.

Mr. *F. E. Harris* then gave evidence, and the Committee adjourned till yesterday.

COLNE VALLEY WATER BILL.

House of Lords Committee.—Thursday, May 2.

(*Before Lord* RIBBLESDALE, *Chairman, the Duke of* WELLINGTON, *Lord* RITCHIE, *Lord* DEVON, *and Lord* TEMPLEMORE.)

The object of this Bill is to confer further powers on the Colne Valley Water Company, for the raising of capital and for other purposes.

Mr. HONORATUS LLOYD, K.C., and the Hon. SYDNEY HOLLAND appeared for the promoters. The petitioners against the Bill were: The Busbey Urban District Council, represented by Mr. C. C. HUTCHINSON; the Watford Urban District Council, by Mr. WEDDERBURN, K.C.; the Wembley Urban District Council, the Hendon Rural District Council, the Wealdstone Urban District Council, the Harrow-on-the-Hill Urban District Council, the Ruislip-Northwood Urban District Council, and the Hendon Urban District Council, by the Hon. J. D. FITZGERALD, K.C., and Mr. R. S. Clease; and the Middlesex County Council, by Mr. G. J. TALBOT, K.C.

Mr. HONORATUS LLOYD, in opening for the promoters, said the Company were originally incorporated in 1873. Their share capital consisted of £250,000, all of which had been issued, and a loan capital of £77,500, of which something over £68,000 had been issued. They had, therefore, about £9000 to go on with. The water was derived from deep wells situated at Busbey; and it being rather hard, they had to go to the expense of putting it to a softening treatment. The water was pumped to a reservoir at Bushey Heath, whence it was distributed by gravitation to the various parts of the district. Another well was being sunk at Eastbury. A pumping-station was at the present time being constructed at Eastbury. In recent years the district had been rapidly increasing. The Company were practically at the end of their capital, and had come to Parliament to ask for further money powers to enable them to undertake necessary works in the nature of mains, which they had to lay in order to meet the requirements of the district. The Company's works were opened in 1876, and for some time were not financially successful. For the first six years of their life they were unable to pay any dividend at all. For the next two years they paid 1 per cent., the next year 2 per cent., the following year 2½ per cent., and in 1890 they reached 3 per cent. Since then they had improved, until last year they were enabled to pay 9½ per cent. Although the Company were not one of those to which the auction clauses applied—they had not been under any obligation hitherto to issue their capital under the auction clauses—they had voluntarily for many years so submitted their capital. The result was that they had obtained substantial premiums on the more recent capital issued; and the sum which stood as capital now upon which no dividend was payable amounted to something over £70,000. The average dividend paid was 3¼ per cent. The capital they sought was £240,000 of share capital and £60,000 loan—making a total of £300,000. Passing on to deal with the petitions against the Bill, Counsel said that it was alleged that the amount of capital asked for was more than was necessary. The keynote of the opposition was "reduction of charges." The charges were upon three different bases. At Harrow, the statutory scale was 7 per cent. on the rateable value all through; in another area, the statutory scale was 8 per cent.; and in the rest of the district the scale varied from 7½ to 5 per cent., according to the value of the hereditament assessed, and based, not upon the rateable value, but upon the gross estimate. The scales in force were by no means high, and were thoroughly justified by reason of the conditions prevailing in the district. There were very long lengths of dead or unremunerative mains. The Middlesex County Council, in their petition, said that the Company had abstained from making application for further powers to Parliament and the Board of Trade; and the result was that the business had been conducted in quite an arbitrary manner, regardless of the interests of the consumers, and greatly to their dissatisfaction. Counsel then went on to deal with the rest of the petitions.

The CHAIRMAN: Do all these petitions proceed on the same lines? Is the battle on reduction of cost everywhere?

Mr. HONORATUS LLOYD replied in the affirmative.

Friday, May 3.

When the Committee met this morning,

Mr. VESEY KNOX announced that negotiations were taking place between the parties.

Mr. HONORATUS LLOYD asked the Committee to allow the Bill to stand over till Monday, as there was every probability that they would not be troubled further with it.

The request was complied with.

Tuesday, May 7.

Mr. CRIPPS, on behalf of the promoters, to-day explained the terms under which the parties had arrived at a settlement. The principle, he said, was a very important one. The present position in the district of supply was that at Harrow there were two rates of charge in existence—one being for one part of the district, and another for another part, while yet a third rate applied in the remainder of the district. In Harrow, the rate was the lowest which the Company charged for water. The settlement was that ultimately the lowest rate at present in existence should apply from Jan. 1, 1907, until Dec. 31, 1908, and as from Jan. 1, 1909, the lower rate was to apply over the whole of the district up to 1913. After that time, a new scale which had been agreed between the parties would come into operation; this scale being in some cases a little lower than the present lowest scale of the Company. At the present time the water-rates were assessed upon the gross estimated rental. The charge was now to be assessed on the rateable value. The effect of reducing the assessment was that a man might possibly pay more at 5 or 6 per cent. upon the reduced assessment than he would have paid at the same rate on the higher assessment. It had been a difficult matter to get clearly into an Act of Parliament; but what had been agreed was that under no conditions should an individual pay more under the new scale than he would have paid if he had remained under the one fixed by the Colne Water Act, 1873. A clause had been drafted for the protection of Hendon, providing that they were to have the same price for water used in any public elementary school as was given to Middlesex.

The preamble having been agreed to, the Chairman was directed to report the Bill, as amended, to the House.

PENRITH URBAN DISTRICT COUNCIL BILL.

Police and Sanitary Committee of the House of Commons.

(*Mr.* CORRIE GRANT, *Chairman*)

This Bill, to authorize the District Council, among other things, to construct additional water-works, to extend the limits for the supply o gas, and to enlarge their powers in regard to the supply of water and gas, occupied the attention of the Committee on Tuesday and Wednesday of last week.

Mr. VESEY KNOX, K.C., who represented the promoters, stated tha there was no opposition to the Bill. He pointed out that large expenditure had been incurred with respect to their sewage disposal scheme; but they had assets which were also very considerable. The gas undertaking, which stood on the books at £20,000, had cost £37,000; and £17,000 had been paid off. With regard to water, the supply at present was taken from the River Eamont, and had been so derived since 1864. The original cost was £15,700; but the whole of this had been repaid with the exception of £700. This had been an extremely cheap supply. The sale of water for other than domestic purposes last year was £581. The balance had been so reduced that it was covered by a sixpenny rate upon all houses which took the supply. But the Local Government Board had condemned the supply as long ago as 1881. There was a possibility of pollution from certain lead workings; and Mr. Baldwin Latham had advised the Council to go to a more permanent supply. Under the Bill they proposed to take their supply from a lake called Hayeswater, which was situated over 1000 feet above the sea level; and arrangements had been made with Lord Lonsdale's trustees for the acquisition of this water and for certain other rights which would enable them to carry out the scheme. A 9-inch main 18 miles in length would be laid, which would be capable of delivering 700,000 gallons to the town, and 300,000 gallons compensation water to the stream. There would be more water than would be required by Penrith itself; but it was thought that some of the surrounding districts might be supplied by agreement—in fact, one district had already applied to them for a supply. No pumping would be necessary. For a town of this size, it would be an expensive supply; the additional expense being £40,050. In addition to this, it was calculated that £6650 would be required for the extension of mains. The charge to the town would depend upon whether they sold much water in the adjoining districts. If they did not succeed in selling much in this way, the charge would be something like 1s. 5d. or 1s. 6d. in the pound; but seeing that it was a soft water and excellent for use in engines, they were hoping to increase their sale to the North-Western Railway Company. At the present time the consumers paid 6d.

Mr. BOYCE, on behalf of the Local Government Board, asked if the proposal was that there would be a charge of 1s. 6d. to the consumer, but not to the ratepayer.

Mr. VESEY KNOX: Yes, to the consumer.

Mr. *Baldwin Latham* gave evidence on behalf of the scheme. There were to be two reservoirs—a high one and a lower one. The latter would have a capacity of 194 million gallons. He had satisfied himself that there would be a sufficient quantity of water not only for the present population, but for some time to come. They hoped to have the scheme completed within two years.

Mr. BOYCE remarked that their point was that the present works should terminate at the earliest possible moment, and the Committee ought not to give them more time than they could help for the completion of the proposed scheme.

The CHAIRMAN stated that the Committee were anxious about the time allowed for the completion of the works, because, from the health point of view, it was quite obvious that something ought to have been done in Penrith long ago.

Witness said that as soon as the promoters got their Act there was no reason why they should not enter into their contract. They could deliver water within two years of the signing of the contract.

Dr. *Haswell*, the Medical Officer of Health, said that some time ago there was an outbreak of fever; but nothing in the way of disease had been traced to the water supply since 1901.

Mr. *Hellon*, the Public Analyst of Whitehaven, stated that he had recently analyzed a sample of the proposed water, and found it exceptionally soft.

Mr. TALBOT (who appeared with Mr. Vesey Knox) said that what they asked the Committee to do was to bring the various parishes along the line into the water area.

Mr. *Wainwright*, the Clerk to the Council, said that the highest rate that they had charged for water was 1s. Gas was at present being supplied by them in some portion of the district, but they were asking for an extended area. Both the Penrith Rural District Council and the West Ward were agreeable to the proposal. The proposed districts had no other supply or possibility of getting it. At present the charge for gas was 2s. 8d. per 1000 cubic feet within, and 3s. 8d. outside, the district.

The preamble of the Bill having been found proved, the Committee proceeded to deal with the clauses.

Under Part IV. of the Bill, which deals with the supply of gas, clause 49 provides that the limits within which the Council may supply gas under the Order of 1877 shall be extended so as to include the parishes of Edenhall, Langwatby, Dacre, Newton, Catterlen, and Plumpton Wall in the rural district of Penrith and the parishes of Brougham, Clifton and Yanwath, and Eamont Bridge, in the rural district of the west ward. By clause 50, provision is made that the price to be charged by the Council for gas supplied to persons who consume by meter shall not at any time exceed 4s. per 1000 cubic feet within the district and 5s. within the remainder of the limits of supply. It is also provided by further clauses that the Council may demand for any gas supplied through a prepayment meter a not greater charge than for gas supplied to private customers within their limits of supply through any other kind of meter, or by any other method of supply. The prescribed number of candles is not to be less than 14. The quality of the gas supplied shall, with respect to its illuminating power, be such as to produce, at the testing-place, when burned at the rate of 5 cubic feet per hour, a light equal in intensity to that produced by 14 sperm candles. All gas supplied by the Council to any consumer of gas shall be supplied at such pressure as to balance a column of water not less than 8-10ths of an inch in height at the main, or as near as may be to the junction therewith of the service-pipe supplying the consumer. The Council may contract with any local authority, company, or persons beyond the Council's limits of supply (but only with the consent, in writing, of any local authority, company, or person supplying gas under parliamentary powers in the district) for the supply of gas in bulk upon such terms and conditions and for such periods not exceeding in any case seven years from the making of the contract.

The question of period for the repayment of loans having been raised,

Mr. *Baldwin Latham* expressed the opinion that the 9-inch pipes to be laid for the water supply would last 70 or 80 years.

The CHAIRMAN stated that the Committee felt that the present case was on a parallel with Skipton, which had been quoted as a precedent in the matter of period; and they would allow 60 years.

Upon the suggestion of the Committee, the promoters agreed to take £45,050, instead of £40,050, for the purchase of lands, and £1650, instead of £6650, for the extension and improvement of mains—the period of repayment in the latter case being fixed at 30 years.

Reverting to the question of completing the water-works with as great dispatch as possible,

The CHAIRMAN said they wished to see that the works were carried out with celerity. It was not so much a question of the completion of the whole of the works at an early date as the necessity for a pure water supply.

The period allowed for the completion of the water-works was three years; and the supply to the town was to commence within 2½ years from the passing of the Act.

The Stamping of Hire-Purchase Agreements.—In the course of one of the recent debates on the Budget, a resolution was proposed that a hire-purchase agreement should be charged with stamp duty, as an ordinary agreement. The Chancellor of the Exchequer explained that hire-purchase agreements for chattels took various forms, and the question of the stamp they should bear had given rise to a great diversity of opinion and practice. There were three possible categories in which they might fall, and had been held to fall. In the first place, such an agreement might be treated as one relating to the sale of goods, in which case it would be exempt from duty; in the second place, it might be treated as a bond or covenant, and so be liable for the high rate of duty such documents bore; and, thirdly, it might be treated as an ordinary agreement, subject to the agreement stamp. It was now proposed that it should come in the last category; the object being to secure uniformity of practice. The resolution was agreed to.

Metropolitan Water Board.—The fortnightly meeting of the Board was held last Friday—Sir Melvill Beachcroft, the Chairman, presiding. The Finance Committee reported that, acting under the authorization of the Board, they instructed the Bank of England to make arrangements for an issue of money bills to the amount of £500,000 at six months' date. The total applications amounted to £1,857,000, at prices varying from £98 8s. 1d. to £98 4s. 9d. Tenders at £98 6s. 4½d. received about 40 per cent. of the amount applied for, and those above this price were allotted in full. The average yield on the accepted tenders is £3 6s. 1·6d. The Committee thought the Board would consider this result satisfactory, having regard to the present condition of the Money Market. The report was adopted. In reply to a question, Dr. Beaton, the Chairman of the Water Examinations Committee, stated that the Committee had considered the question of the Director's monthly report as to the condition of the raw and filtered waters, and had come to the conclusion that they would issue a report which could be understood by the general public. The Board adjourned till the 24th inst., when their last meeting will be held.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Friday, May 10.

(*Before Mr. Justice* SWINFEN EADY.)

Taff Vale Railway Company v. Cardiff Gas Company.

This was an action turning upon the construction of sections 6 and 7 of the Gas-Works Clauses Act, 1847; and it raised the question of the right of a Gas Company to lay their pipes in the soil of a bridge across a railway—such bridge forming part of a public road, but being the property of a Railway Company. The relief claimed was an injunction restraining the defendant Company from laying gas-mains in the soil of a certain bridge in the parish of Whitchurch, forming part of a road leading from that town to Llandaff, and also for a mandatory injunction to remove the mains which had been already laid there—the work having been commenced in October last. The defendants alleged that they were authorized to do the work by the above-named Act, which was incorporated in their Special Act.

Mr. WARMINGTON, K.C., and Mr. J. G. WOOD, appeared for the plaintiffs; Mr. EVE, K.C., and Mr. TREVOR LEWIS represented the defendants.

Mr. WARMINGTON briefly stated the facts, and mentioned that, though the action was brought with regard to one bridge only, a good many others might be affected. He then proceeded to cite various authorities to show that gas companies were not authorized, under the Act of 1847, to interfere with buildings; and he submitted that the bridge in question was a building. The cases of *Thompson v. Sunderland Gas Company*,* *Lancashire and Yorkshire Railway Company v. Mayor of Bury*, and *Normanton Gas Company v. Pope and Pearson*† were relied upon; and the judgments in them were quoted at some length. In the course of his remarks, Counsel stated that some of the flanges of the pipes were above the surface.

Justice SWINFEN EADY said that if there were any case made that the pipes were too large or were negligently laid, it ought to have been specifically alleged and proved; but this did not affect the question of the defendants' right to lay their pipes where they were. Of course, their only right would be to lay them properly.

Mr. WARMINGTON said the fact was that there was not room in the soil for the pipes, some of which were actually resting on the iron-work of the bridge; and he submitted that this was contrary to the section.

The following evidence was then given.

Mr. *G. T. Sibbering*, the plaintiffs' Chief Engineer, said the bridge in question had two outside main girders with thick ones connecting them; and on the cross girders were laid arched buckle-plates, on which the road metalling was placed. The depth of this varied from 6½ to 12 inches. After the gas-pipes had been laid, he had the ground opened to examine them. Their external diameter was 4¾ inches, and at the flanges 7½ inches. They rested on the iron buckle-plates on the summit of the arched portion. The flanges would protrude from ¼ inch to ½ inch above the former surface of the metalling. They were covered by a ridge of metalling running the whole length of the bridge; the surface of the road being thereby raised. The pipes laid in this way had no effect on the stability of the bridge. The Railway Company had statutory power to lengthen the bridge and raise the level, in order to get sufficient headway over the new railway; and in carrying out the work they would have to move the pipes and raise them.

In cross-examination, witness said the length of the bridge was about 47 feet. The gas-pipes were, he believed, in 9-feet lengths. He himself measured them, and also the flanges. He opened a trench the whole way through, and in no case did the flange rest on the top of the arch, but between the arches. After opening out the trench, he and his men cleared away the metalling on each side, so as to get to the old surface of the road, and then put a straight-edge across, and found the flanges would protrude above this level about ¼ inch or ½ inch.

Re-examined: There was a ridge now over the line of pipes. If they were brought down to the level of the undisturbed part of the road, one or more of the flanges would be uncovered, and a horse might slip on it, and the Railway Company might then have to pay damages.

Mr. *W. J. Edwards*, assistant to the previous witness, corroborated his evidence.

In cross-examination, he said that the flanges were 2·75 inches larger than the pipes, half of which would be above the line, so that from 0·25 inch to 0·75 inch represented the extent to which the flange was above the surface. Taking the mean of these figures—viz., 0·5 inch—and deducting this from 1·37 inches, would leave 0·87 inch; so that for the whole length of the line of pipes, this would represent the thickness of the soil covering it. It was no doubt very small; but he could not make anything else of it, on the figures.

Mr. WARMINGTON said this was the plaintiffs' case.

Mr. EVE remarked that it was not the case foreshadowed in the pleadings or in the opening. His friend had spoken of the importance of the case to the Railway Company, not because the defendants had in this particular instance laid the pipes at this short distance below the soil, but as to whether they had the right to lay them over bridges without regard to the obligation it might cast on the Railway Company when the line was widened and the bridge had to be lengthened, and possibly the surface raised, and it became necessary to reinstate the road and provide for pipes in the future. The real question was whether the Gas Company had a right to lay pipes subject to the statutory obligation to make compensation for any damage done. The statement of claim set forth that the laying of the pipes caused damage to the plaintiffs by adding to the weight carried by the bridge; but this

* See "JOURNAL," Vol. XXIX., p. 378; and Vol. XXX., p. 13.
† *Ibid.*, Vol., XL., pp. 1002, 1127; and Vol. XLI., p. 1060.

was disposed of by their own witness. The sole issue was whether the defendants were justified, under their Special Act, which incorporated the General Act of 1847, in doing what they had done; and it turned on sections 6 and 7. Counsel cited the case of *Provost of Glasgow v. Glasgow and South-Western Railway Company*, which arose under the Water-Works Clauses Act, 1847. It was there held that there was a right to lay water-pipes in the soil of a bridge, but not to interfere with its structure. Here, defendants would have been glad to go deeper if they could have done so; but, owing to the somewhat shallow soil on the top of the bridge, it was necessary to go down to the buckle-plates, and put the line of pipes where it was. He failed to see how this was in excess of their statutory powers, though, of course, they were liable for any damage that might be done.

Mr. *George Millington* was then called. He said he was foreman of the fitting department of the defendant Company; and superintended the laying of the pipe in question. It was 4 inches in internal and 4¾ inches in external diameter; and the collars varied between 6½ and 7 inches. The pipes were laid along the right-hand side of the road, coming from Whitchurch, between 3 feet and 3 ft. 6 in. from the parapet. They would have been under the footpath if there had been one. There was no interference with the structure of the bridge; he took particular care about that. They went down as far as they could, with pick and shovel, to the crown of the arches. The pipes were in 9-feet lengths. The first flange came on the buttress; the one in the centre on one of the bevelled plates; and another, at the other end, on the buttress. They did not interfere with the bridge in any way. He had no idea of the present action being brought; and he did not take any measurements; but he should say approximately that there was from 10 to 12 inches of soil on the top of the buttress at either end. The pipe would occupy about 5 inches of this soil, leaving the same quantity above it. He examined the pipes before the ground was filled in, and at not one place did they show above the surface.

Cross-examined: He only spoke from recollection, but was quite certain there was sufficient covering for the pipes, or he should not have had them laid in the trench; and, being close by the side of the road, there was no traffic there. He had on several occasions passed the place since the action was commenced, but did not examine it. He did not take up the earth. He knew there was a ridge over it; but that was left by the plaintiffs' men. After the pipes were laid in the morning, the Railway Company sent their men at night to take them up. They stripped the whole of the main across the bridge, and reinstated the ground themselves. He could not say that they did it as the defendants would have done it; and this accounted for the ridge. If this was removed, the flanges and pipes would not be exposed. He took no steps to compare the top of the pipes with the level of the road, except by the eye; but anyone could tell whether or not a pipe was covered. In ordinary cases, the depth of pipes was considerably greater than in the present instance; but in this one they were on the side of the road, where there would be no traffic. The main, no doubt, was very near the surface.

Mr. WARMINGTON, in reply, said the section of the Water-Works Clauses Act which came in question in the case cited by his friend was not quite the same as the one in the Gas-Works Clauses Act, especially with reference to this particular point of placing pipes against a building. Section 7 of the latter Act said: "Provided always that nothing herein shall authorize or empower the undertakers to lay down or put any pipe or other works into, through, or against any building." The latter words did not occur in the Water-Works Clauses Act; and he submitted that here the pipes were placed against a building, and that this was a breach of the section, which was a proviso upon, and limited, the preceding section.

Justice SWINFEN EADY, in giving judgment, said there was no dispute between the parties as to what had really been done. The bridge in question was a public highway, and the defendants had opened the surface, made a trench, and laid their pipes in it. In no way whatever had they otherwise interfered with the bridge. It was contended that the defendants were not entitled to do this, because, though under section 6 of the Gas-Works Clauses Act, 1847, they had power to break up streets and lay pipes in them and over bridges, the section was limited by the proviso in the following section, to the effect that nothing was to authorize or empower them to lay down or place any pipe "into, through, or against any building;" and it was said that the bridge in question was a "building" within the meaning of section 7, and that the defendants had placed their pipes against it. Excluding this section for the moment, he thought it was quite clear that what the defendants had done would be within the language of section 6. That was to say, it was covered by section 6, unless it was affected by the proviso in section 7—unless it was contended that the bridge was a "building." He was of opinion that the latter section did not preclude the defendants from placing their pipes upon a bridge within the meaning of the preceding one. The two sections must be read together; and whether the pipes had some small layer of dust or dirt between them and the iron plates and girders of the bridge, or were laid directly upon the structure, was immaterial. The defendants had power to lay their pipes within or under the soil of the street (which had been done), where the street passed over the bridge; and, in a sense, it might be "against" the building, however much soil there was immediately under the pipes. Even if the pipes rested upon the soil, this in turn would be supported by the structure of the bridge, but section 7 did not prevent the undertakers from laying their pipes within or under the soil of the street where it crossed the bridge, even though the main itself might rest upon or touch the metal work. Under these circumstances, he was of opinion that the defendants had done nothing so far but what they were entitled to do under the Act. Then it was said that they must reinstate, and that the manner in which the pipes had been laid left a small portion of their collars ½ inch to ¾ inch above what would be the old surface of the road. On this point there was some dispute. Having reviewed the evidence on this part of the case, his Lordship said he thought it was sufficient to say that the plaintiffs had failed to prove that in any instance any portion of the pipes was above the surface of the road; and therefore, on the evidence, he must come to the conclusion that after they were laid the ground was properly reinstated, without any portion of the pipes showing above the surface of the road. The action must be dismissed, with costs.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Thursday, May 9.

(*Before Mr. Justice* JOYCE.)

Meters Limited v. Metropolitan Gas-Meters, Limited.

This was a motion for sequestration in respect of breach by defendants of an injunction restraining them from infringing letters patent granted to Daniel Orme, of Oldham, No. 15,740, of 1893, relating to prepayment gas-meters.*

Mr. A. J. WALTER, K.C., and Mr. COLEFAX appeared for the plaintiffs; Mr. BOUSFIELD, K.C., and Mr. GRAY represented defendants.

Mr. COLEFAX said the action was originally brought upon two patents; but the present motion related only to No. 15,740. In August, 1906, plaintiffs set down the case for trial; and on Oct. 23, defendants served plaintiffs with a notice returnable on the 25th of October.

Mr. GRAY said, with the view of shortening the case, he would admit at once that the thing complained of was manufactured and sold by the defendants after the date of the injunction.

Mr. COLEFAX said he preferred to mention the dates. By consent, an injunction was granted restraining the defendants from infringing the two patents, ordering the payment of the taxed costs, and an inquiry as to damages. Under this order, the taxed costs had been paid, and the inquiry to ascertain damages was still proceeding. In November, 1906, defendants sold and supplied to the Wilmslow and Alderley Edge Gas Company the meter of which complaint was made, and on Feb. 14, 1907, the present motion was made to sequestrate the real and personal property of the defendant Company for breach of the injunction. The specification related to pieces of mechanism in prepayment gas-meters. The first part related to opening and closing the valve which admitted or cut off the gas (and it was this that now came in question); while the second part was an arrangement for adjusting the meter so as to allow of the variation in the price of gas. Prior to the date of the patent, it had been customary, in closing the valve, to rely upon a spring; but difficulties were found, owing to this becoming weakened or interfered with by grit getting in. Plaintiffs' patent provided for the certainty of closing the valve by the positive action of a cam-face against which a pin bore. Having called attention to the language of the specification of the patent in question, Counsel said the infringement consisted in the use of a two-way cam which opened and closed the valve in exactly the same way as the plaintiffs' arrangement. In addition to this cam, they also had a spring for closing the valve; but if they really trusted to the spring, there was no reason why they should put in the cam.

Mr. *Dugald Clerk* was called, and said that, in his opinion, the defendants had infringed the plaintiffs' patent.

In cross-examination, witness said that in the defendants' meter the valve was opened by means of a cam and closed by a spring. In the meter complained of, the valve acted by the spring, and not by the double cam action.

Mr. BOUSFIELD said the motion had to be disposed of upon the sworn evidence; and it was therefore important to observe that the only allegation against the defendants was that contained in the affidavit of Mr. William Severs (the Gas Company's Manager) to the effect that on the 20th of December last he purchased, in the ordinary course of business, the meter which had been produced in Court. There was no evidence as to the sale of any other meters. In the one produced, the valve was closed by the spring; and Mr. Clerk, when pressed, would not say that it was an infringement. All he said was that, if sold in any number, there might be something which, in the course of time, might stick; and then, the spring not acting, the cam would come into play, and there would at once be an infringement. It was also urged that the spring might break; but he did not think there was any fear of this occurring—at all events, not during the life of the plaintiffs' patent.

Mr. *S. R. Lowcock* said with regard to the suggestion that the reverse side of the groove would operate as a cam to close the valve in the event of obstruction by grit, this was not his view. If there was sufficient resistance to prevent the spring doing its work, that against the reverse side of the groove would be so great that it would not drag the valve down, and the mechanism would be injured.

Cross-examined: The spring would not deteriorate during the life of a meter. Gas suppliers were aware that the valve was closed by the spring.

Re-examined: He had never known of an instance where the spring had broken or failed to act.

Mr. COLEFAX, in replying upon the whole case, admitted that sequestration procedure was not resorted to except in extreme circumstances; but it was the only method the plaintiffs had of bringing the matter before the Court. The first claim in the patent covered the incorporation in a prepayment gas-meter of means whereby one could effect the closing and opening of the valve by a two-way cam. In the admitted infringement, there was a cam which positively closed the valve; and the defendants now acknowledged that they had adoped the same angle in their cam which, if it operated, would be the part that would close the valve. The evidence given proved that in many cases, in the probable working of the meter, it was not the spring but the cam which brought about the complete closing of the valve; and therefore the plaintiffs were entitled to the order asked for.

His LORDSHIP said he would take time to consider his judgment.

Monday, May 13.

Justice JOYCE, in giving judgment this morning, said this was an application for sequestration against the defendant Company's property for an alleged breach of an injunction restraining infringement of a patent which would expire in August next. The infringement alleged was in using a certain apparatus for closing a valve. It was said that the defendants had, for the purpose of closing the valve, inserted a

* An abstract of the specification was given in the "JOURNAL" for Sept. 4, 1894 (p. 473).

spiral spring, which in the normal working of the meter had undoubtedly the effect stated; but it was said that there was a notch or slot in the cam so shaped that if the spring broke or wore out it would or might operate to close as well as to open the valve. If this was so, it was not the normal working of the defendants' machine. In a certain sense it was a kind of accident that the notch or slot was so shaped as to make the cam close the valve under certain circumstances, and was not the result of any invention or design. The defendants said the spring would not cease to act during the life of a gas-meter. Having regard to all the circumstances, he had come to the conclusion that there had been no wilful disobedience of the order of the Court, and the application would be refused; but as he could not help thinking that there was some ground for it, the order would be without costs.

DUBLIN POLICE COURT.—Saturday, May 11.

(*Before Mr.* SWIFTE, *Divisional Magistrate.*)

The Quality of Dublin Gas.

To-day his Worship resumed the hearing of summonses (*ante*, p. 397) issued by the Corporation of Dublin against the Alliance and Dublin Consumers' Gas Company, for supplying gas of which the illuminating power did not, the complainants alleged, when tested in the manner prescribed by the Company's Act of 1866, equal that prescribed therein and by amending Acts. There were three summonses relating to three separate dates—one set alleging a defective supply on the 28th of January last, and the other two sets on the 29th of the same month and the 4th of February respectively.

Mr. IGNATIUS O'BRIEN, K.C., and Mr. PHILIP WHITE (instructed by Mr. Ignatius J. Rice) appeared for the Corporation; Mr. RONAN, K.C., and Mr. JOHN GORDON, K.C., M.P. (instructed by Messrs. D. & T. Fitzgerald), represented the Company.

Mr. *William Brent*, Chief Gas Examiner in the employ of the Company, whose cross examination had not concluded when the case was adjourned, was further cross-examined by Mr. O'BRIEN. He remembered having told Mr. Gordon the last day that there were three things which led to inaccurate tests—viz., not testing the meter itself, not making an allowance for changes in temperature and pressure, and not using the cubic foot measure. It was always his practice when making tests to use the cubic foot measure for correcting the meter. The way in which he carried out his tests was by passing air through the meter; and he thought this in every way as reliable as passing gas through the meter. He was aware that in London the authorities required the meters to be charged with gas instead of air, and also that in London they had given up the cubic foot measure and adopted a one-twelfth of a foot meter. But he did not think there could be any difference in the results, as the principle was the same. Witness did not know that the particular mode of testing the gas in Dublin was prescribed by the Act of 1871. When he made his first test at 5 o'clock on the evening of Jan. 28, he found that the gas being supplied was 16·88 candles. He took four sets of observations, and corrected on each set. The first was begun at 5 o'clock, the second at 5.50, the third at 6.15, and the last set shortly afterwards. In connection with each test, he made ten observations, and made no correction for thermometer and barometer between start and finish, but took instead the mean of the thermometer and barometer in the observations. On the night of Feb. 26, he made four tests; and instead of taking the mean, he took the thermometer and barometer at the start and finish of each testing. While he was making his first observations, the thermometer was 63° and the barometer 29 7 inches; and till he had completed his last set of observations there was only a change of 1° in temperature. He had never known a change of more than 2° while a test was being made. He always saw that the Company's standard meter was kept in proper order.

Re-examined by Mr. GORDON, witness said that for more than nine years he knew the rooms in which he made the testings, and of his personal knowledge he could say that the temperature never varied more than 2° at the outside. With the barometer at 29·7 inches and the thermometer at 63° Fahr., 15·9 candles when corrected would be the same as 16 candles. On each occasion all his observations had been made with the utmost accuracy. The gas testing-station was new, and was fitted up as lately as 1896. In regard to variations during testings, there were many things which went to cause them. One of the principal matters an examiner had to guard against was the candles, and a sudden pull or slackness in the mains. It was on account of these variations that so many tests had to be taken to get a true average.

Professor *Vivian B. Lewes*, in reply to Mr. GORDON, said he was acquainted with the method of testing gas in Dublin, and knew the station in Tara Street. He had seen the award of 1889, and knew the sort of burner prescribed by it, and also the kind of photometer. The photometer was a proper and suitable one for a flat-flame burner, which was a much more severe test on the gas than the argand burner. He considered that the station as he saw it in 1896 was properly equipped in every respect. In the two end rooms there was a cubic foot measure; and it was absolutely necessary to have such an instrument there for testing the gas. The whole object of the test was to get the true illuminating power at the rate of 5 cubic feet per hour at a temperature of 60° Fahr., and a barometrical pressure of 30 inches. It was of the utmost importance that the meter should be adjusted with the greatest accuracy and care; otherwise it was impossible to know the exact quantity of gas that was being used. To do this, tests at least once a week were required. From his own experience, he would not regard a standard meter alone as an accurate test for testing gas; he would want in addition to have the temperature and barometric pressure. He would not depend upon any test of gas in which barometric pressure was not taken into consideration. He had been in the testing-station on Friday night, when he visited two of the rooms used for testing purposes. He found everything in them all right, and nothing to suggest that either was not adapted for the work. The photometers in both rooms were the same as he had seen before, and the arrangement was also, as well as he remembered, much the same. He tested with the cubic foot measure and the barometer, and was satisfied with the tests. He was in the station from about 8.30 until 10.30, and was given to understand that Mr. Cotton, the Corporation Gas Examiner, was there also. At 8.35 and 9.30 the barometer was 29·6 inches and the thermometer 63·5°. The first ten readings which he made brought out 16 77 candles, the second set (at 8.55) brought out 16·44 candles, and the third test (at 9.30) showed 16·69 candles. The corrected result showed 17 candles, which he considered was a very good illuminating power. In his presence, Mr. Brent, the Gas Company's Examiner, afterwards made a series of tests. Witness could not see that there were any physical or structural difficulties to prevent proper testing.

Witness's examination having concluded, the hearing of the case was adjourned until next Saturday.

Crowborough District Gas Company.

Presiding at the half-yearly meeting of the Crowborough District Gas Company, Mr. R. Howard gave a brief account of matters which had occurred in connection with the management of the Company since the annual meeting in September. There was, he said, no report or balance-sheet to be presented at the meeting, which was a sort of interim gathering, without, he regretted, an interim dividend, which could not yet be expected. At the first meeting of the Directors after the annual meeting, it was necessary to appoint a new Chairman, as one of the retiring Directors held that post. The honour of the chairmanship was conferred upon him (Mr. Howard). Mr. Painter, the late Engineer, tendered his resignation; and there was no alternative but to accept it. Mr. Walker, the late Secretary, also wished to resign, but was prevailed upon to remain with the Company until Christmas, when Mr. J. H. Horne was appointed to succeed him. At the last annual meeting, many suggestions were made for the improved working of the Company. One of these was that the office should be removed from London to Crowborough; and this had been done. Mr. Andrew Dougall, Engineer to the Tunbridge Wells Gas Company, had been appointed Consulting Engineer; and in a report which he presented to the Directors, he expressed the opinion that it would not be difficult to get a considerable increase in the number of consumers if a liberal policy for connecting up was pursued. It was advisable to take steps to popularize the use of gas for incandescent illumination, and also for cooking purposes. He suggested that cooking-stoves should be hired out and fixed free of charge; while the slot-meter system was also useful. Mr. Dougall recommended that gas engines and exhausters should be purchased for Crowborough and Mayfield. Two were secured; and the one at Crowborough resulted in the gas obtained per ton of coal being increased from 8000 to 10,200 cubic feet. It was hardly up to this satisfactory average at Mayfield; but they hoped the make would increase in time. The bankers had allowed an overdraft; and the Directors became personal guarantors for £500. In the last balance-sheet, it was shown that £1455 was owing to sundry creditors, including £800 to the coal merchant. The former Manager having resigned, one was obtained temporarily from Tunbridge Wells, until the appointment of a qualified Engineer, Mr. Cooke, of Sherborne. Mr. Dougall had reported on the necessity for an additional gasholder; and they were offered one for £612. The overdraft on the bank was subsequently increased to £1000. There were some shares unissued; and if the shareholders supported the Directors by applying for them, there should be no difficulty in securing the necessary money for the holder, and making the Company a dividend-earning concern.

Gas Matters at Dukinfield.—At last week's meeting of the Dukinfield Town Council, Alderman Stafford reported a loss of £240 on the year's working of the gas undertaking. This arose, he said, owing to an increased assessment, the low price received for residuals, and a large outlay in rebuilding. He moved that the price of gas be increased by 2d. per 1000 cubic feet—making it 2s. 9d.; and he pointed out that this was necessary owing to the rapid advance in the price of coal. Mr. Bancroft ridiculed an increase because there had been a loss one year; and eventually the whole question was referred back to the Gas Committee.

Management of the Newcastle-under-Lyme Gas-Works.—As the result of a lengthy discussion, it has been resolved by the Newcastle-under-Lyme Town Council (on the casting-vote of the Mayor) that Mr. E. P. Baskeyfield, the Secretary to the Gas Department, is to continue to have control of the works for three months. This was the recommendation of the Gas Committee; but an amendment was moved that a manager should be advertised for to fill the place of the late Mr. W. Winstanley. The member who was responsible for the amendment urged the need for a practical engineer, who thoroughly understood all the business in connection with a gas-works. But an alderman replied—or, at any rate, he is reported to have done so—that he was satisfied personally with the qualifications of the present Secretary, who had had 18 years' experience in gas-works, "which was quite sufficient length of time to learn what little there was to know about gas-works. It was not a genius who was required."

An Increased Salary for Mr. Stevenson at Coventry.—The Coventry City Council have adopted a recommendation of the Gas Committee that the salary of Mr. Fletcher W. Stevenson, the Gas Engineer and Manager, be increased from £700 to £750 per annum as from March 25 last. It was explained by Mr. Batchelor (the Chairman of the Gas Committee) that the make of gas five years ago was about 565 million cubic feet per annum, whereas now it is more than 750 million cubic feet; the greater consumption necessarily entailing more work all round and greater responsibility. He said the Committee had made inquiries as to the salaries paid to managers in other towns; and it was found that companies paid at a much higher rate than corporations. Taking the country through, the salaries of gas engineers and managers came out at £1 4s. 11½d. per million cubic feet of gas made. An amendment that the question of salary be postponed until the completion of the new works at Foleshill was defeated by 20 votes to 9.

MISCELLANEOUS NEWS.

PROGRESS OF BOLTON CORPORATION GAS-WORKS.

Presentation to the Engineer and Manager.

In the Mayor's Room, Bolton, last Wednesday evening, interesting presentations were made to Mr. William Smith, the Gas Engineer and Manager of the Bolton Corporation Gas-Works, on the occasion of his completion of 21 years' service in that capacity. There was an attendance of some 200 employees of the department in all its branches, together with representatives from other departments of the Corporation. The chair was occupied by Alderman Wild, the Vice-Chairman of the Gas Committee, who had on his right hand the Mayor (Alderman T. B. Tong), and on his left Mr. Smith, the guest of the evening. There were also present Alderman John Miles, J.P., Councillors Hodgkinson, Harling, Blackman, and Webster, Messrs. D. L. Harbottle (the Deputy Town Clerk), A. A. Day (the Electricity Engineer), Sidney Smith (the Assistant Gas Engineer), G. A. Brockbank (the Assistant Overseer), and others. At the commencement of the proceedings, the Chairman welcomed the large gathering present, and called upon Mr. Farrant to read letters of apology from councillors and others who were unable to be present.

His Worship the Mayor was then called upon to make the presentations, which consisted of a handsome illuminated address and a silver loving cup. He said he could not have been asked to make a presentation to an official of the Corporation for whom he had a greater regard than he had for Mr. Smith. The occasion of the presentation—Mr. Smith's 21st anniversary of service—was a most suitable one. Mr. Smith did not come to the Corporation without experience. The Bolton Corporation, and especially such an important department as the gas undertaking, did not take novices for such positions as Mr. Smith held; but he must say that the Gas Committee of 21 years ago had made a very wise choice. When Mr. Smith undertook the management, the department, either in dimensions or prosperity, was nothing like what it was to-day. The profit the department made towards the relief of the rates was not everything, for the amount written off, according to the quantity of gas made, was far greater than it was a score of years ago. The Corporation, as well as those who were employed in the department, well knew Mr. Smith's worth. He had done his duty to the Corporation, and also to the workmen connected with the department, making them as comfortable as it was in his power to do. From the experience he (the Mayor) had in going over the works recently, he believed Mr. Smith had further benefits in store for the workmen. Mr. Smith put his whole heart and soul into his work; and he hoped that re-union would be the means of cementing the good feeling which existed between himself and the employees. The Mayor then read the text of the address, which was as follows:—

> To William Smith, Esq., Gas Engineer and Manager to the Corporation of the County Borough of Bolton. Dear Sir,—We, the employees of the Bolton Corporation Gas Department, desire to express our appreciation of the many admirable qualities that you possess as a man, and the esteem and respect you have won by the kindly way you have always treated us as employees. We willingly bear testimony to your well-known kindness of heart, and the ready sympathy to redress grievances when made known to you. We cannot allow this opportunity of 21 years' service to the Bolton Corporation to pass without acknowledging from the vantage point of the workmen how admirably and successfully you have carried out the duties of Manager of so important an undertaking; and while we congratulate you for the faithful service in the past, we hope the future will have in store for you mercies and blessings that will make the declining years of your life the best. We sincerely hope you may have health and strength to continue to discharge the duties you have honourably and faithfully carried through to the present, and that the amicable relations existing between you and us continue to life's end.—We are faithfully yours, the employees of the Bolton Corporation Gas Department, Bolton. April, 1907.

The loving cup bore the following inscription:—

> "County Borough of Bolton. Presented to William Smith, Esq., on his 21st anniversary, by the employees of the Gas Department, Bolton Corporation, as a small token of respect and esteem in which he is held by them, as well as for his kindness and cordiality to all during the 21 years he has been Gas Engineer and Manager. April, 1907."

Mr. Smith replied by saying that he felt deeply grateful for the kindly words the Mayor had spoken, and to his brother workmen for their kindness in presenting him with the beautiful address and silver cup. He could assure them that he would prize these tokens of their goodness very much as long as he lived; and they would be something that his children would prize long after his part was played on the stage of time. During the 21 years that he had served the Bolton Corporation as Engineer and Manager of their gas-works, the men and himself had not always seen eye to eye; but he had always done what he believed to be fair, both to the workmen and to his employers. When any dispute had been been settled, it was forgotten; and they went on as if there had been none. He could honestly say that he had never tried to punish a man for trying to better himself; and he was very pleased to state that all the men and himself were working hand in hand for the benefit of the Gas Department and the ratepayers generally. He appreciated this token of the workmen's kindness to him, not for its intrinsic value only, but for the good and kindly feeling it exhibited. He hoped that the same good feeling would continue to exist between the men and himself so long as he remained Engineer and Manager. He thanked the Mayor for his kindness in presenting the testimonial, and for giving the use of his room for the purpose; and also the Chairman for presiding, and for the many acts of kindness he had received at his hands since he became a member of the Gas Committee. He was very sorry that the Chairmam, Alderman Horrocks, was not able to be with them; but he hoped that he would soon be restored to health. He was pleased to see Alderman Miles there. As they were all aware, Alderman Miles was Chairman of the Gas Department for many years, and during that time did yeoman service to the town. He thanked him for the many kindnesses he had received at his hands during the long period that he was Chairman, and trusted he would be long spared to give his matured judgment and service in Corporate matters.

A vote of thanks to the Mayor for presiding was passed; and Alderman Miles, in supporting it, spoke of the great progress effected in the gas-works since Mr. Smith's advent. There was not a brick or stone or piece of ironwork which was the same as when Mr. Smith came. Everything spoke of progress; and it was well known throughout England that there were very few gas-works that stood in the front as the Bolton Gas-Works did for the results attained. Mr. Smith was as good to-day in strength of mind and purpose as when he came to Bolton. He trusted he might long continue in his present state of health. The Bolton Corporation were well satisfied with Mr. Smith's services; and he hoped the kindly feeling existing between Mr. Smith and the workpeople would long remain. Councillor Webster having spoken in appreciative terms of Mr. Smith, Mr. Macdonald, an old workman, said he had never known a man so solicitous for the welfare of the men as Mr. Smith. Others also spoke in similar strain; and the vote of thanks to the Mayor was carried with musical honours. A vote of thanks was then accorded to the Chairman; and the remainder of the evening was spent in conviviality.

It will be interesting to note that during the time Mr. Smith has been Engineer and Manager at Bolton, the make of gas has increased from 579,211,000 to 1,029,155,000 cubic feet per annum, and the make per ton from 9871 to 10,567 cubic feet. Both the Gas Street and Lum Street works have been entirely remodelled, and new retort-benches, condensers, scrubbers, washers, exhausters, boilers, tanks, purifiers, hydraulic machinery, railway sidings, and gasholders have been erected from time to time, to Mr. Smith's designs and under his directions. Great engineering skill has been shown, not only in the apparatus for gas and sulphate making, but in the distributing of the gas. The system of trunk mains show the forethought and practical knowledge put forth. Some 277 miles of mains have been laid, ranging from 36 inches down to 3 inches diameter. About 45,284 gas-meters have been fixed, varying from 2000 to 2 lights; and the total number of public lamps at the present time is 6049. The number of consumers before Mr. Smith went to Bolton was 20,380; to-day it is round about 44,200, and still increasing. But the plant is so well designed that there will be no difficulty in supplying the demand for gas for many years to come; and the Bolton Corporation, even for this point alone, are fortunate in having so capable and far-seeing an Engineer. Mr. Smith as Manager has proved that there is little he does not know in this direction. The maximum gross yearly profit is £75,401.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly General Meeting of the Association was held last Tuesday, at the Cannon Street Hotel, E.C.—Mr. J. HORSLEY PALMER in the chair.

The SECRETARY (Mr. R. W. Wilson) read the notice convening the meeting, and also the following report of the Directors:—

The Directors have the pleasure to report that the results of the Association's operations for the second half year of 1906 have proved satisfactory.

The profit of the half year, added to the sum of £4534 6s. 5d. brought forward from the preceding half year, amounted to £238,640, as compared with £228,695 for the corresponding period of 1905.

The quantity of gas sold shows an increase at the rate of 7·21 per cent.

That a corresponding rise in the profits has not attended this considerable advance in the sales of gas is due to a higher net cost of coal, and to considerable increases which have been conceded in workmen's wages; this latter item alone entailing an increased charge for the period under consideration of about £5000.

The total quantity of coal carbonized during the half year was 498,596 metric tons, at an average gross cost of 18s. 1·68d. per ton, as compared with 17s. 4·55d. per ton for the corresponding half year of 1905—an increase of 9·13d. per ton. But slight compensation was obtained by a rise in the prices realized for coke and ammonia products, while the revenue from tar exhibited a decrease; the result being that the net cost of the coal rose from 6s. 8·78d. to 7s. 4·33d. per ton—an increase of 7·55d. per metric ton.

The total number of meters in use at the end of the half year was 449,814—an increase of 42,780. The number of prepayment meters was 99,365, or 16,707 more than on Dec. 31, 1905.

The total number of consumers on the books of the Association on Dec. 31, 1906, was 373,595, as against 334,943 on the corresponding date of 1905—an increase of 38,652, or 11·54 per cent.

In the half year, 64 miles of new mains were laid, making the total length of mains laid on Dec. 31, 1906, 2294 miles.

At Antwerp, the Association secured exclusive contracts for the supply of gas in the suburban communes of Bouchout, Edegem, and Hove until the year 1935.

In view of the circumstances that the new works at Hoboken will not be in operation for some time yet, and that the producing power of the station was inadequate to the continually increasing demand, it was found necessary to extend the retort power at the Berchem works by the addition of eight furnaces, containing 56 retorts, which were duly erected. Progress was also made in the construction of the gasholder tanks, wharfing, pier, and jetties at Hoboken; and contracts were let for the construction of two gasholders there, each having three lifts, and a capacity of 2½ million cubic feet.

At Berlin, the contracts with the suburban communes of Französisch-Buchholz and Heinersdorf were prolonged for ten years—*i.e.*, until 1957 and 1958 respectively. At the Mariendorf works, a retort-house was erected in which eighteen furnaces of nine inclined retorts each were installed and put in action. This house will also contain seven furnaces of eight vertical retorts each for which, together with the necessary coal and coke handling plant, contracts have been let. New exhausters, washers, condensers, &c., were erected in the half year in the apparatus house, which was extended for the purpose. The additional coal and coke handling plant and purifiers

referred to in the report for the first half year of 1905 were completed and put in action. At the Weissensee works, two new condensers, a new boiler and house, and rooms for workmen, were put up and completed. In connection with the distribution of gas under high pressure to districts at a distance from the works, district governors were put up at three different points; and two new district offices have been opened to deal with the requirements of consumers.

At Brussels, eight settings, each of nine inclined retorts, together with a new house to contain them, were completed, and the office and dwelling-house on the works were remodelled and extended.

The Association's monopoly of the supply of gas in La Gorgue, a suburb of Estaires (one of the Association's smaller stations in France), was prolonged for 31 years—*i.e.*, until 1941.

At Flushing, where there has been a large increase, amounting to 15 per cent. in the gas sold, a new "Standard" washer was erected.

At Frankfort, the erection of seven new furnaces, each of nine inclined retorts, together with the necessary coal and coke handling plant, was proceeded with, and brought near to completion.

At Hanover, a new retort-house and two benches each of nine furnaces of nine horizontal retorts, together with an installation of West's charging and drawing machines, were completed and put in action.

At Komotau (one of the Association's small stations in Bohemia), a generator furnace of eight horizontal retorts and a plant for the manufacture of sulphate of ammonia were completed.

The contract with the town of Les Andelys (a small town in France which the Association had supplied with gas since the year 1878) expired on Sept. 14 last. The town, having the right to take over the works at a valuation on the expiration of the concession, decided to avail themselves of it, and have accordingly purchased the land, works, mains, and all the plant. This contingency had been duly provided for in the Association's amortization account.

At Vienna, land for which the Association had no further use, was disposed of at satisfactory prices.

In conclusion, the Directors desire to draw the attention of the proprietors to the accounts for the half year ended Dec. 31 last. These have been duly audited; and from them the Directors have, in accordance with the provisions of the Companies' Clauses Consolidation Act, prepared a scheme, showing the profit of the Association for the half year and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—viz., a dividend of 4 per cent. for the half year ended Dec. 31, 1906, payable, free of income-tax, on and after Tuesday, the 14th inst.

The Directors who go out of office by rotation are: John Henry Birchenough, Esq., C.M.G., Corbet Woodall, Esq., and Hugh Goodwin Newton, Esq. These gentlemen are eligible for re-election, and offer themselves accordingly. The Auditor who goes out of office is Joseph Gurney Fox, Esq., who is eligible for re-election, and offers himself accordingly.

Scheme for the Division of the Profits of the Half-Year ended Dec. 31, 1906.

Balance brought forward from last half year	£4,534	6	5
Profit resulting from the workings at the stations and dividends on investments, less interest on debenture stock, and the charges on account of depreciation and income-tax	234,105	16	4
	£238,640	2	9
Dividend at 4 per cent. for the half year	£197,600	0	0
Credit to pension reserve.	25,000	0	0
Balance carried forward to next half year.	16,040	2	9
	£238,640	2	9

Disproportionate Profits and Increased Business.

The Chairman said it became his duty to move the adoption of the Directors' report. The report was so full that he certainly did not intend to keep the proprietors very long that day. The half year under review had been a successful one in certain directions; it had been a very anxious, and, he might say, disheartening one in other directions. And they finished up the half year with prospects that he could not call rosy. There were, however, several points of interest in the half-year's working which he should like to mention. Two of the features of the report were again the very large increase in the number of the consumers, and in the amount of gas sent out and paid for. He had had drawn out for him by the Secretary some figures which did not appear in the report, but which might be of interest to the proprietors, and which bore upon this particular matter—that was to say, the increase in the sales of gas, and what he might call the diminished profits arising therefrom. He proposed to give an extract from this statement. The actual profits of the half year were £234,105; but the increase on the corresponding period of 1905 was only £5411, or at the rate of 2⅓ per cent. This small improvement in profit in view of the increased volume of business done—equal to about 7¼ per cent.—was, of course, disproportionate. But the figures would show how this was accounted for. The increase in the sale of gas amounted to £63,000 as nearly as possible. The revenue from coke was £30,000 more; and the treatment of ammoniacal liquor yielded £1200 more. These items made a total of £94,200. But at the same time the expenses had increased by £91,000; and they worked out as follows: In round figures, the charges on account of coal, fuel, purifying material, and wages had increased by about £60,000. The "wear and tear," or, more properly speaking, "maintenance" of plant, had advanced by £10,500; taxes, by £2000; salaries and pensions, by £3000; payments to municipalities, £3400; sundries, £6500. These items were what they had had to pay in addition on the station side. In England they had to pay the Inland Revenue authorities £1100 more; and to provide for amortization and depreciation £3000 more. Thus it required an increased outlay of £91,000 to secure the meagre increase in profit of £5400. But, under the circumstances, he thought they might consider themselves fortunate that the extension of the business had enabled them to more than cover the increased charges. Of course, the greater bulk of the increase was due to the cost of coal. Every ton of coal carbonized had cost them 9d. and a fraction more than in the corresponding half of 1905. On the other hand, coke only yielded an increase of 4d.; and as on tar and ammoniacal liquor they lost 2½d., they had only the insignificant sum of 1½d. to set against the increase of 9d. in the cost of coal. Of course, this meant an increased charge against the profits of the half year—seeing that, if they had had the same prices as ruled in 1905, they would have been able to show an increased profit of about £17,000.

Immediate Prospects.

He very much regretted that the prospects for the coming year in regard to all gas companies, both at home and abroad, were not so rosy as they had been in the immediate past. Everybody knew that the price of coal had risen a great deal; everybody knew that manufactories were in full swing, and had to draw very largely from collieries for supplies. Therefore, they must look, in the immediate future, for a still greater expense under the head of coal. He said in the "immediate future" because he had every confidence that good times were coming for gas companies in the future as they had come in the past. The members of the Board had often seen coal driven up in price to a great height, and then, after a short period, the price had fallen again. They must take the rough with the smooth And therefore he said that things did not look, at the present time, very rosy for gas companies in the immediate future.

Maintenance, Rates, and Municipal Payments.

He should like to say a few words with regard to the large increase in the item quoted for maintenance, or wear and wear. This was an item that had always a tendency to grow. But in these days, when large sums had been expended on labour-saving appliances, and the coal from the moment it left the steamer or the railway-waggon until it was dispatched in the shape of coke was hardly touched by hand, one would have thought that they would have felt greater benefit from all this expenditure than was being realized at present. The truth was that, though they were able by these mechanical appliances to do away with a great many hands, all those who were left to work the various kinds of machinery that were employed were very much higher paid men, and much more skilful workers, than those employed in the old shovel and barrow days. And there was no doubt about it that a large sum of money was required every year for the maintenance of this machinery, and some of it was very delicate machinery, which was now used for unloading coal, charging and discharging retorts, and removing coke. The only thing they had to set against this expenditure was that they were employing fewer hands, and had greater immunity from labour troubles; and he supposed they must look upon this as a fair set-off against what they had to spend. With regard to the rates, they had certainly increased on the Continent to a small degree; but they were not affected so much as in England by heavy rating—in other words, there was not much to complain about with regard to being over-rated on the Continent. Where they had rates, they had simply to grin and bear and pay them; but they were not unduly rated. As to the payments to the municipalities, these were steadily increasing year by year; the payments being based on the quantity of gas sold in the towns lighted. As their business increased, they naturally had to pay more. It was a magnificent thing for the municipalities. They simply sat in their guildballs, and took money from the Association, and had not the faintest interest or care as to what the Association were going to receive for themselves.

Sympathy in Distress.

A year ago he had to report a very sad accident at the Courrières mine in the Pas-de-Calais, from which the Association used to take a large quantity of coal. On this occasion, he had to report one in the Saar district, which supplied their Frankfort station with coal. It was a very serious accident; a large number of men were killed; and the Directors thought it only right to show the sympathy of the Association by telegraphing at once, and supplementing the message by a liberal contribution to the relief fund. The action of the Directors in this matter was very much appreciated. But he only mentioned it at this meeting as one of the details of the year.

Difficulty at Frankfort.

Speaking of Frankfort reminded him that they had had some difficulty there with the authorities. He had often spoken from the chair as to the policy the Board had always adopted of assuming a conciliatory attitude towards the authorities of the towns lighted by the Association. This was the proper policy to pursue; and it was a policy the Directors insisted in impressing upon their agents and engineers. It had been faithfully carried out by those working for the Association in the different cities and towns; and it had hitherto met with very great success. But there sometimes arose a burgomaster or somebody else who thought fit to, so to speak, worry the life out of those directing the Association. They had, notwithstanding all their efforts for conciliation, been very much troubled of late at Frankfort; so much so that the Directors had been at last obliged to take steps and go to law over the matter. The question involved was an important one for the Association; in fact, it might almost be said to have been a question of the life of the Association in Frankfort. In the first instance, the case was decided against the Association; but when it was taken to the higher Court, it was decided in favour of the Association. The town then appealed to the highest Court of all at Leipzig; and the Directors were informed, about a fortnight ago, that the Association had won the case completely. This settled the matter with regard to the present lawsuit; and he could only hope—and it would be his sincere endeavour to hold out the hand of friendship to the town—that the outcome would be that the authorities would be as good friends with the Association in the future as they were a few years ago. The Directors would instruct Mr. William Drory, their Senior Engineer (who was present), to do his utmost to make their relations with the authorities as amicable as they were formerly.

Vertical Retorts.

Some of the proprietors might be interested in a matter about which he (the Chairman) spoke a year-and-a-half ago—that was, the progress of the vertical retort. He noticed the matter was constantly being discussed in the gas journals. He merely wished now to say that they considered, so far as their experience had gone on the Continent, that these retorts had passed the experimental stage, and were working in a fairly satisfactory manner. One of the Directors had lately been on a visit

not only to the Association's own stations where vertical retorts were erected, but also to Cologne, Dessau, and Potsdam, and other towns which had taken up this system; and he wrote to him in these terms: "I may say at once that, from the structural and mechanical points of view, the system is a success. The retorts were perfectly heated at Dessau and Oberspree, and the operation of charging was simple." The report went on to say that the system had really not been sufficiently long at work to absolutely know whether the financial aspect of working over a series of years would be as satisfactory as the methods that had been in vogue at the Association's stations now for many years.

NEW WORKS FOR ANTWERP.

With regard to the new works that the Association were constructing at Hoboken, for the supply of Antwerp, the progress this winter had not been so good as they had hoped. But it had been a severe winter; and the subsoil had not turned out quite so satisfactory as they were led to expect from the many borings made.

THE PENSION RESERVE.

There was one item in the report upon which he should like to make a remark. It was the amount allocated to pension reserve. It was £25,000; and that was the utmost they could put to the fund on this occasion. He was sorry it was not a little more.

The DEPUTY-CHAIRMAN (Mr. Arthur Lucas) seconded the motion, which was unanimously carried.

The CHAIRMAN moved, and Mr. J. H. BIRCHENOUGH seconded, the declaration of a dividend of 4 per cent. for the half year on the £4,940,000 of stock, payable free of income-tax, on the 14th inst.

The retiring Directors (Mr. Birchenough, Mr. Corbet Woodall, and Mr. Hugh Goodwin Newton) were severally re-elected on the motion of the CHAIRMAN, seconded by Mr. LUCAS, Mr. TINDALL, and Mr. WOODALL. In his remarks, the Chairman said he was sure no one worked harder, or could work harder, in the interests of the Association, than Mr. Woodall.

On the motion of Mr. B. HARRIS, seconded by Mr. M. S. PILCHER, Mr. J. Gurney Fox, the retiring Auditor, was re-appointed.

The CHAIRMAN said they could not separate, this being the principal meeting of the year, without moving a hearty vote of thanks to the staff. It was on this occasion that they had the benefit of the presence in London of their officers from abroad; and it was indeed a great advantage both to the Board and to their officials. They had the pleasure of having them here face to face, and cross-examining them on many points; and their replies and information were, as a rule, most satisfactory. The vote of thanks included not only the staff abroad, but the staff in London. The Secretary was known to all the proprietors; and they were aware how worthy he and his staff were of their thanks.

The DEPUTY-CHAIRMAN, in seconding the motion, said he wished the proprietors would visit the stations, and make themselves acquainted not only with the works, but with the engineers who had charge of them. If the proprietors who paid such visits had any experience of the gas industry at home, he felt convinced they would go away satisfied that there was a no more able staff than that possessed by the Association. This was a most valuable asset, because, after all, compared with the knowledge of their Engineers, most of the Directors had only a very amateur capacity (if he might put it in that way) in regard to the technical side of the work; and they were materially and practically in the hands of a most devoted staff of men. It was owing to them that the great success of the Association was mainly due.

The motion was heartily carried.

On the proposition of Mr. J. DRAGE, seconded Mr. PILCHER, a vote of thanks was passed to the Chairman and his colleagues.

An acknowledgment by the CHAIRMAN concluded the proceedings.

GAS TESTING AT SOUTHPORT.

The "Metropolitan" No. 2 Burner Sanctioned.

Some months ago—as was recorded in the "JOURNAL" at the time (Jan. 15, p. 168)—a Board of Trade arbitration took place with reference to the burner to be used for the testing of Southport gas. In the Act providing for the supply by Southport of gas to Birkdale, the stipulation is that the tests shall be by the "London" argand No. 1 burner, or such other burner as may be approved by the Board of Trade on the application of either party. Southport desired to follow the example which has been set by other places, and change over to the "Metropolitan" No. 2 burner; and to this Birkdale objected, on the ground that the alteration would result in the same gas showing from 2 to 3 candle power higher under the new conditions than under the existing ones. At the inquiry—which was held before the Hon. T. H. W. Pelham and two other members of the Board of Trade—the Southport Corporation were represented by Sir George Livesey, Alderman Travis (the Chairman of the Gas Committee), Mr. J. E. Jarratt (the Town Clerk), and Mr. John Bond (the Gas Engineer); while those appearing on behalf of Birkdale were Mr. Pye and Mr. Hayes (Chairman and ex-Chairman of the Lighting Committee), Mr. Isaac Carr, and Mr. J. G. Newbigging.

It was stated at a recent meeting of the Southport Gas Committee that a letter has been received from the Board of Trade authorizing the use of the "Metropolitan" No. 2 burner, in place of the "London" No. 1.

Electric Light Failure at Oldham.—The fusing of an electric wire a few nights ago was responsible for a considerable amount of commotion and no little alarm at Oldham. The theatres, hotels, and public buildings were thrown in darkness; and at the Empire Theatre a panic was narrowly averted. When the light went out, sparks could easily be seen coming from the wires connecting the stage and the wings. Many women rose shrieking from their seats; but they were soon calmed by a voice crying, "It's all right, sit still," and by the circumstance that the actors showed no alarm.

GAS PROFITS AT ROTHERHAM.

In the last number of the "JOURNAL" (p. 392), it was recorded that at the meeting of the Rotherham Borough Council on the previous Wednesday the Chairman of the Gas Committee (Alderman Gummer) reported that the net profit realized by the working of the gas undertaking the last financial year was £8471, compared with £6471 in the year 1905-6. At the same meeting, the subject of the allocation of this profit gave rise to a long discussion; the occasion being the "budget day" of the Corporation. The MAYOR (Colonel Stoddart, V.D., J.P.) presided during the first portion of the sitting. The minutes of the Council in Committee showed that they had considered the accounts for the past year, together with the estimates of the several departments; and they recommended that the latter, as settled by the Finance Committee, together with the recommendations in the report of the Borough Comptroller (Mr. C. H. Moss) as to the allocation of profits, be approved, with the exception of the part referring to the amount granted by the Gas Committee out of their profits for the relief of the rates, which was altered from £6500 to £5500.

The MAYOR, in moving the adoption of the minutes, remarked that in all probability there would be an amendment with regard to the £5500 which it was proposed to devote to a reduction of the rates from the gas-works profits, as the Chairman of the Gas Committee (Alderman Gummer) objected to the Council taking £5500 instead of £4500, which he thought the proper sum, from the profits of the gas department, because he (Alderman Gummer) considered the consumers were practically entitled to the profits. It was argued, and he (the Mayor) thought properly, that the ratepayers were entitled to a reasonable amount of the profits made by the gas undertaking; but when he said "a reasonable amount," it would not be reasonable, for instance, if they sought to appropriate the whole of the profits. An undertaking of this kind must have a certain amount set apart as a contingent fund, for any special repairs or a large breakdown, without coming upon the revenue for the particular year. By the proposed allocation of £5500, they were leaving about £3000, which the department would be able to add to the balance from last year; so that there would be a reserve fund of practically £5560. Alderman Gummer said that he was prepared to give the Council £4500, while they wanted £5500; and if they did not get it, it would mean that they must raise the rate 2d.—viz., to 9s. 2d. in the pound—for the present year.

Mr. BECKETT (the Chairman of the Finance Committee) seconded the motion. Referring to the trading undertakings of the Corporation, he said he should like to emphasize what Alderman Gummer had said in Committee—that it was almost impossible that the profits of 1907-8 would be so good as those of 1906-7. They would have an increase in the price of coal when they renewed their contracts; and if the Gas Committee should decide to reduce the price of gas, this would mean a still further heavy decrease of revenue. Much as he would like to see a reduction in the price of gas, he was doubtful as to whether the present time was opportune for it. In another year, the Council could hope to have less need to ask for such large amounts from the gas profits for rating purposes. He suggested that it would then be the proper time to grant concessions to the gas consumers. He congratulated the Gas Committee on their successful management of the undertaking, which had last year yielded the largest profits ever realized. After alluding to other departments, Mr. Beckett said the loss on the water-works for the year was £1045 after paying all expenses on loan charges; and the loss for the current year could not be less than £1000. The Gas Committee had voted £500 towards this loss. At the end of the year there would be in the Water Department a deficiency of £4000. He concluded by emphasizing the importance of all Committees keeping their expenditure within the estimated income, and denying themselves luxuries for which they could not afford to pay.

Alderman GUMMER moved an amendment to the effect that the amount of the gas profits handed over should be £4500, instead of £5500, and referred to the fact that in Committee the Mayor had met him half way by reducing the amount from £6500 to £5500. He did not think any apology was needed for his amendment. The Borough Comptroller said in regard to the gas-works: "The Committee would be well advised if they retained a very substantial portion of the surplus as working capital." He submitted that, considering the net surplus was £8474, leaving only £3000 could not, by any possible stretch of imagination, be described as "substantial." As to Mr. Beckett's remarks as to the present time being inopportune for a reduction in the price of gas, he admitted that the ratepayers were entitled to a reasonable amount from the gas-works. The question was what was "reasonable." The Council were asking at the present time for what was equivalent to a rate of 7¼d. in the pound on the rates. He was of opinion that what would be equal to a rate of 3d. in the pound would be a proper amount. In addition to the sums set apart for the rates, the Gas Department was paying off the capital of the undertaking a sum of £1030 a year, which was practically reducing the debt on an asset of the Corporation. The gas consumers, therefore, had to provide £5500 for the relief of the rates and £1030 for capital charges, or a total of £6530. He suggested that the time was opportune for a reduction in the price of gas, as the profits from the works were higher than had ever been known in the history of the undertaking. It might be asked why, during the thirteen years he had been Chairman of the Committee, the question had not been brought forward before. He gave several reasons, including the remodelling of the works and the high price of coal. It had been said by Mr. Beckett that, unless they got the £5500, the rates would have to go up. There was another way of preventing this—viz., to keep a tight hand on the spending Committees, so that they should keep within their estimates. Why should the ratepayers ask the gas consumers to find all that was spent over the estimates of the Committees, pay for the whole of the public lighting, contribute £500 towards the deficit of the Water Department, and give such a handsome sum to the general district fund? He remembered in 1900, when coal was very dear, a resolution was carried in the Council to increase the price of gas 3d. per 1000 cubic feet to the ordinary consumer. This affected 4000 of them. From that time to the present year no less than £14,122 had in all been taken out of the gas

consumers' profits; and the rates had been relieved to the extent of £29,300 handed over in the shape of public lighting and the relief of the rates.

The MAYOR asked if the Committee had reduced the price of gas since then.

Alderman GUMMER said they had not. If they had not increased the price of gas at all, a sum of £1500 would have been handed over to the rates. The additional 3d. per 1000 cubic feet was still charged. At that period, no consideration was paid to the gas consumer. He must not only carry the burden of the increased price of coal, but the additional burden of the rates. Alderman Gummer went on to contend that there was no risk to the ratepayers in regard to the money borrowed on account of the gas-works. On the other hand, since the Corporation had purchased the works (in 1871), the gas consumers had paid in interest on loans £158,858, in repayment of loans £32,000, and in relief of rates £91,838—making a total coming out of the gas consumers' pockets of £282,688, or £8000 per annum. He admitted that the ratepayers were entitled to some consideration; and he had already said that it should be to the extent of what was equal to 3d. in the pound on the rates, or £2200 a year. But during the past 31 years the undertaking had yielded what was equivalent to a rate of 6d. in the pound in relief of the rates, and one-fifth of the general district rate. He felt justified in asserting that the gas consumer had been robbed of his just reward of the efforts of the Gas Committee. Were they treating him fairly and equitably? He contended that the spending Committees of the Corporation should be called upon to keep within their estimates, or should bear the responsibility if they failed to do so, and the Gas Committee should not have all the blame in the eyes of the ratepayers. Alderman Gummer proceeded to give some very interesting comparisons to show how the manufacturers, shopkeepers, and householders were affected by the high price of gas and the relieving of rates out of the profits of the undertaking. One large manufacturer had to pay £150 more for his gas to relieve another to the extent of £75 in his rates who contributed nothing to the gas profits, because he produced his own electric light. Why, he asked, should a prominent tradesman pay £25 per annum for gas to relieve another, his near neighbour, who used electric light, of £18 per annum? There were 8000 consumers belonging to the working-classes, who consumed on an average 10,000 cubic feet of gas per annum. He estimated that they paid 5s. each extra, which went in relief of the rates of 394 landlords who resided out of the town. Why should the better class be relieved of their rates at the expense of the gas consumer? A question had been asked why the price of gas was so much higher in Rotherham than in other towns. Well, he attributed it to the policy pursued by the Corporation in taking money from the gas undertaking to relieve the general district rate. He asked that the Gas Department should be allowed to pay off the balance due to the bank, that the gas consumer should receive consideration, and that a reduction in price should be made of 3d. per 1000 cubic feet to the ordinary consumer. If it were possible, also, they should arrange a scheme whereby the automatic meter consumer should receive consideration. They might, he thought, very well make a reduction in price for power gas, to encourage manufacturers to use it instead of fuel. The Gas Department had borne the burden and been the camel of the Corporation long enough. It was time it was put on a better footing.

Mr. JENKINS seconded the amendment, and contended that it was not good business management to expect the Gas Department to be continually in debt at the bank to find money for the Corporation. If the gas undertaking was doing well, the gas consumers should have had a fair share of the benefits.

Mr. SMITH supported the recommendation of the Committee. He asked, if they allowed the £1000 to remain with the Gas Department, and it raised the rates 3d. in the pound, what the effect would be on the credit of the town. If the result was that the rates were raised only 2d. in the pound, the credit of Rotherham would much more seriously depreciate than if they took the proposed £1000 from the gas undertaking.

Alderman WINTER emphasized the point that if the £1000 was not devoted to the rates as proposed, these would have to be increased 2d. in the pound.

Mr. CRANK said it seemed to him that whatever was overspent in other departments had to be made up by the Gas Department. He thought the price of 2s. 9d. per 1000 cubic feet was unreasonable; and therefore some consideration ought to be given to the consumers for the burdens they had borne during the last six or seven years.

Mr. HOUGHTON supported the amendment, as he thought the gas consumers had been long enough the "long-suffering burden-bearers;" and it was time the Council came to their assistance.

After some further remarks, the amendment was lost by 8 votes to 20. The sum of £5500 will therefore be allocated during the present year to the relief of the rates.

Welsbach Incandescent Gas-Light Company, Limited.—Pending the issue of the accounts of this Company for the year ending the 31st of March last, the announcement is made that the Directors will recommend a dividend at the rate of 5 per cent. per annum, and that a sum of £15,000 has been placed to the reserve. The amount carried forward is not stated; but if the dividend recommended is declared, it may be reckoned at about £1900. Last year it was £7321.

Unsatisfactory Electric Lighting at Faversham.—The Town Council of Faversham had a rather warm debate at their meeting last Tuesday on the following motion by Mr. A. Towner: "That, in consequence of the unsatisfactory lighting of the streets by electricity, and the existing heavy rates incurred thereby, steps be taken to dispose of the electric light undertaking, with a view to reducing the rates of the borough; and that this matter be referred to the Electric Light Committee to consider, and report to the General Purposes Committee." In the course of the discussion, it was acknowledged that there had lately been an improvement in the light; and, in the result, an amendment, proposed by the Chairman of the Electric Light Sub-Committee, to defer the matter until the autumn, and then go thoroughly into it, was carried.

BURTON CORPORATION GAS SUPPLY.

At the Meeting of the Burton-on-Trent Town Council last Wednesday, the report of the Gas and Electricity Committee for the year ending the 31st of March was presented. The gas-works revenue account showed that the income from the sale of gas was £40,785, that £11,049 was obtained from the sale of residuals, and that the total receipts were £58,302, compared with £59,612 for the year 1905-6. The expenditure was £58,302, against £59,612; a reduction from £15,738 to £14,974 being effected in the carbonization of coal.

In the unavoidable absence of the Mayor (Alderman T. E. Lowe), who is the Chairman of the Committee, the adoption of the report was moved by Alderman Tresise. He said he found himself in a unique position; but, in regard to the gas undertaking, the Mayor had entrusted him with the notes of his speech, which he proposed to read. This opened with hearty congratulations to Mr. Sydney Ramsden on the result of the first year's working since his appointment as Assistant-Manager. There were, however, other things that had helped them. The Gas Committee had been steadily consolidating the funds of the undertaking, with the result that the reserve and depreciation funds now amounted to upwards of £30,000, or more than one half the amount of the unpaid capital. So that if they had to realize, they would have to find £26,000 to pay off outstanding loans and have for sale a business worth £250,000. People who talked about the town's indebtedness should not forget to refer to this magnificent asset. Turning to the accounts, which presented many interesting features, manufacture had steadily improved. They were gradually increasing the yield of gas per ton of coal carbonized; while the unaccounted-for gas had been reduced first from 12 or 13 per cent. down to 10 per cent., and now to about 6½ per cent. It had been found that the station meters had been registering fast, and this was the chief cause of the previous high figure for gas unaccounted for. The profit was more than £20,000 gross and nearly £12,000 net; and it had been made after allowing the town a reduction of about £500 a year on the street lighting. The gross profit would pay nearly 10 per cent. on the capital expenditure. This was a handsome return, and it had been obtained after they had reduced the price of gas for power purposes to compete with producer plants. As to their proposed reduction in the prices for power, the Committee felt that as they stood at present they were not quite equitable, and did not meet the competition. They were 2s. 4d. per 1000 cubic feet for small gas-engines, 1s. 9d. for medium ones, and 1s. 6d. for very large consumers. The Committee propose a graduated scale from 2s. to 1s. 6d., which would enable them to bring in several large consumers who would otherwise put down or extend their present gas-producer plants. He regarded it as most important that this resolution should be carried, in order that the Committee might retain these consumers. It might be urged that they could not afford to sell gas at 1s. 6d. But this price allowed something beyond the cost of manufacture to go to the fixed charges, and he trusted that as time went on they might still further reduce their works costs. They must not lose power customers; and therefore it was most urgent that the resolution should be passed. The same argument applied to charges for gas for manufacturing purposes. The Mayor then went on to deal with the debt on the electric light undertaking, and expressed regret that the Committee were not able to report so substantial a balance to be put to the reserve as in the last two years; the amount being reduced from £1073 to £484. They were sorry the financial results did not harmonize more with those of the gas undertaking; but they were hopeful as to the future.

The motion having been seconded, Mr. King offered a few remarks in support of the report. He said he believed one of the reasons for the present sound financial position of the gas undertaking was that the Mayor and the members of the Committee had taken special interest in the works during the last six months. If it had been their own business, they could not have devoted more time and better attention to the works. Mr. Hutchinson thought there was a large margin between 1s. 6d. per 1000 feet for gas for power and 2s. 9d. for ordinary consumption. About £300,000 had been provided out of the gas profits for the good of the town; and he thought the time had arrived when they could afford to be generous to ordinary consumers, as their reserves now stood at £30,000. He considered the proper charge should be not more than 2s. 3d., though he did not ask for so low a price at present. Mr. Rowland said, as in the past he had criticized the gas-works finance, he was glad to offer the Committee his congratulations on the present occasion. He very heartily associated himself with Mr. King's remarks on their work; for they had altered the whole financial policy of the undertaking. They had paid off a considerable sum in loans, and while they found the reserve fund was reduced from £13,000 in 1899 to £7571 in 1902, he was glad to notice that it was now £18,000. Bearing this in mind, he thought the time had come when they should consider Mr. Hutchinson's suggestion in regard to a reduction in price to ordinary consumers; but he advised that gentleman to give them a year's grace. Mr. Warde endorsed Mr. Rowland's remarks, and pointed out that the Committee should have no hesitation in carrying out improvements at the works. From what he knew of their Consulting Engineer (Mr. Bell), he would carry out the work well; and he had spoken highly of Mr. Ramsden. The report was adopted.

At a subsequent stage of the proceedings, Mr. Tresise moved a resolution, to which reference had been made by the Mayor, providing for a graduated reduction in the price charged to large consumers of gas for power and heating purposes. He explained that the object was to discourage the provision of private gas-producer plants, and also to give an inducement, in the shape of cheap gas for manufacturing purposes, to outsiders to come to Burton. Mr. King seconded the motion, and it was agreed to.

The current number of the "Business Man's Magazine" (an illustrated monthly magazine issued from Thanet House, Strand) contains an article on "Accountancy in Gas Business," by H. L. Millspaugh. In it the author explains a system for handling the accounts of consumers in which the general methods are discussed and illustrated. The records used are the ledger, cash-book, reading card, and street card.

HARROGATE GAS COMPANY'S LIGHT RAILWAY.

Last Tuesday, Mr. F. Barber, the Chairman of the Harrogate Gas Company, performed the ceremony of "cutting the first sod" in connection with the light railway which the Company are going to put down to facilitate the conveyance of coal from the North-Eastern Railway to their works. Particulars of the scheme were given at the extraordinary meeting of the Company held for the purpose of securing the proprietors' sanction—which was reported in the "JOURNAL" for the 16th ult., p. 174. It was then explained that the line was to be 1½ miles in length (including 800 yards of tunnel), starting at Bilton Junction; and the traffic was to be dealt with by a locomotive constructed to haul 30 tons up the maximum incline of 1 in 20·5, in light steel waggons built upon the high-capacity principle now adopted for main-line traffic. A special stage was to be provided at Bilton siding, on to which bogies carrying tanks for the tar and liquor could be run, and the tar and liquor thence discharged by gravitation into the tanks of the Railway Company. The scheme was designed to accommodate an annual traffic of 100,000 tons. The advantages and economy claimed were that the constantly recurring trouble with the road authorities and the residents in the district through which the traffic at present passed would be entirely removed, the Company would be placed in sole control of their own communication with the railway, and an immediate saving in the cost of haulage would be effected, which would result in further saving as the traffic increased in bulk.

When the numerous company had assembled, Mr. Barber was presented by Mr. E. Wilson Dixon, M.Inst.C.E. (the Engineer of the scheme), with a handsome silver spade; and with this, after explaining the scheme, and thanking Mr. Dixon for his gift, he cut the sod, which he then placed in a barrow and wheeled away. He explained that the tender of Messrs. Holme and King had been accepted for the work; and they had expressed their intention of engaging every local man fit to be employed that they could take on. Colonel Holme, on behalf of the Contractors, said he hoped the railway would prove of benefit to the Gas Company.

Subsequently, there was a luncheon at the George Hotel, presided over by Mr. Barber; and at its conclusion an interesting toast list was gone through. The Mayor (Alderman J. Chippindale, J.P.) proposed the "Harrogate Gas Company," to whose enterprise he paid a well-deserved tribute. The Chairman, in giving "The Company's General Manager, the Railway Engineer, and the Contractors," referred in a very complimentary manner to the work done by Mr. H. Wilkinson, whose interest in the further development of the Company's business, he said, deserved acknowledgment. Mr. Wilkinson, in responding, said that if he had been successful in achieving good results it was due to the hearty manner in which the officers with whom he had been associated had co-operated with him.

PUBLIC LIGHTING OF KENSINGTON.

Contract v. Average Meter System.

At the Meeting of the Kensington Borough Council last Tuesday, the Works Committee reported that they had had under consideration a reference to them by the Council as to the advisability of the office and department of the Lighting Engineer being abolished. They had referred the matter to the Street Lighting Sub-Committee, who had submitted a detailed report on the question. It started with the termination of the contract with the Gaslight and Coke Company and the adoption of the average meter system in 1877, when Mr. Philip Monson was appointed Superintendent of Street Lighting. The new system was inaugurated on April 1 in the above-named year; and the first twelve months' working resulted in a net decrease of £1026. In view of certain misapprehensions in the minds of some members of the Council in regard to the work performed by the Lighting Engineer and his staff, the Sub-Committee explained that the whole of the work connected with the public lighting of the borough is carried out by direct labour, whereas in nearly all the other Metropolitan Boroughs it is still done under the old system. They acknowledged that if it was carried out by the Gas Company and their contractors, the Lighting Engineer's department could be abolished, though a number of inspectors would still have to be employed, as well as a clerical staff. They thought, however, that any such step would be a retrograde one; and they could hardly imagine the Council entertaining the idea. They went on to say that they had just received from the Gas Company an offer to enter into a five years' agreement to light, extinguish, clean, repair, paint annually, and furnish with as many mantles as might be necessary to maintain a thoroughly efficient light, the lamps in the borough, including the supply of gas thereto, at £3 10s. 4d. per lamp per annum; and the Sub-Committee submitted the following comparative statement, showing what the cost of lighting would be on the basis of this offer and the actual cost for the year to March 31, 1906:—

Gas Company's Offer.

Lighting, &c., 4506 public lamps, at £3 10s. 4d. per lamp	£15,846	2	10
Expenses of inspecting and clerical staff	400	0	0
Total	£16,246	2	10

Actual Cost for the Year ending March 31, 1906.

Gas supply, stores, plant, &c.	£13,704	10	6
Salaries of engineer and clerks	500	0	0
	£14,204	10	6
Credit by amounts received in respect of private lamps	70	8	4
Total	£14,134	2	2

This showed a balance of £2112 in favour of the Council doing the work themselves. The Sub-Committee expressed the belief that this amount had been saved in almost every year since the average meter system had been inaugurated; and they submitted detailed comparative statements showing the actual cost of the public lighting in the years 1880, 1890, and 1900, and the amounts which would have been paid had the contract system been in operation, to justify their opinion on this point. We give the totals, as follows:—

	1880.		1890.		1900.
Estimated cost by the contract system	£16,819	..	£13,775	..	£14,116
Actual cost	14,830	..	11,614	..	13,114
Saving	£1,989	..	£2,161	..	£1,002

The Sub-Committee explained that the reduction in the balance shown in the last statement was accounted for by the fact that considerable expenditure was incurred during the year in connection with the substitution of new "Kensington" pattern lanterns and incandescent burners for 14-inch lanterns and the old flat-flame burners in a number of streets in the borough.

In conclusion, the Sub-Committee said they failed to see that any advantage would accrue to the Council by the abolition of the office of the Lighting Engineer; in fact, it was their opinion that the department was carried on at the present time on exceedingly economical lines, and could be said to fully justify its existence. The Works Committee concurred in this view, and recommended that no action be taken upon the reference.

The Town Clerk (Mr. W. C. Leete) stated that he had received a letter from Mr. H. Rayner, the Secretary of the Gaslight and Coke Company, expressing regret at having discovered that the quotations in his letter required considerable modification, as they had been based upon the 4300 hours' lighting scale which was in force in many of the Borough Councils' districts, instead of on the scale of 3730 hours' lighting upon which the Kensington prices should be based. The total amount should therefore be £14,845. The Town Clerk pointed out that according to this letter the balance in favour of the Council doing the work themselves (£2112) must be reduced by the difference between the first offer of the Company (£15,846) and their modified figure (£14,845). A letter was read from a Ratepayers' Association in favour of the Council doing the work themselves; and, after some discussion, the recommendation of the Works Committee was unanimously adopted.

METER TESTING IN MANCHESTER.

The Index Test.

In his fourteenth annual report to the Manchester City Justices, Mr. S. Dyson, the Official Inspector of Gas-Meters, states that the number of meters tested during the year to March 31 was 43,868—a decrease of 2166 compared with the previous year. The fees received, including bank interest, amounted to £1670; being a decrease of £66. The decrease in the number of meters tested is accounted for by the loss of time in the removal and the refixing of the standard test holders, the whole of which work was carried out by the staff. The amount expended on equipment last year was £1334; and this, together with the ordinary expenditure of £1726, makes a total of £3060.

Of the total number of meters tested, 578 were rejected, or 1·31 per cent. The figures for wet and dry meters were: Wet meters: Stamped, 15,419; rejected, 229 (1·46 per cent.). Dry meters: Stamped, 27,871; rejected, 340 (1·23 per cent.).

The following table shows the number of meters rejected by the "index test" (which is in operation in Manchester), the faults in which could not have been discovered by the registration test:—

Table Showing Cause of Defects in Meters Rejected by the "Index Test."

Upright Shaft Out of Action with Drum Shaft.	Index Out of Gear with Upright Shaft.	Defective Index Fingers and Wheels.	Damaged Fittings and Worms.	Indexes Transposed	Total.
18	9	57	7	5	96

Dealing with this form of test, the Official Inspector says the testing and certification of gas-meters is carried out under the Sale of Gas Acts, 1859-60, which provides for the appointment of inspectors, and prescribes a form of test to be applied to the measuring chambers of gas-meters. The Act makes no provision for the testing of gas-meter indexes, which is a serious omission, as under the present law it is quite possible for an inspector to stamp a meter as correct while its index registers incorrectly through some defect in its gear. The Manchester Justices' Gas-Meter Testing Committee approached the Board of Trade in 1895, with a view to obtaining an amendment of the Sale of Gas Acts; but without success. The Justices' Committee afterwards opened negotiations with the Manchester Corporation Gas Committee, and recommended that an "index test" should be applied to all gas-meters intended for use in the Manchester area of supply. The City Council adopted these suggestions, and passed a resolution authorizing the Justices' Committee to instruct their Inspector to apply the "index test" to all gas-meters belonging to the Corporation. In July, 1902, this additional test was instituted in Manchester, with the result that at the end of each year a number of meters found registering incorrectly has been tabulated in the Inspector's annual report. The following is a list of the most important cases of meters rejected by the "index test" for incorrect registration during the past year, owing to faulty mechanism. These meters had previously been found correct by the ordinary or registration test.

400-light registering 100 per cent. of error.
10 ,, ,, 150 ,, ,,
10 ,, ,, 150 ,, ,,
10 ,, ,, 150 ,, ,,
10 ,, ,, 150 ,, ,,

The London County Council, he continues, have for some years past also had the subject of gas-meter testing under consideration; and they have recently presented a report to the Board of Trade pointing out the serious defects in the Acts of 1859-60. They have also asked that an amending Bill should be introduced in the present session of Parliament with a view to the obtaining of such amendments of the existing law as past experiences have shown to be desirable. The Board of Trade have issued a circular-letter to the Manchester Justices' Committee, intimating that certain suggestions for the amendment of the Sale of Gas Act 1859 have been recently made to the Department, and asking the Justices' Committee for any observations which they may see fit to offer as to the adequacy of the provisions of the existing Acts in regard to present testing requirements. The Justices' Committee have since forwarded a report upon the subject to the Board of Trade; and they have made certain recommendations which they consider necessary.

During the year the staff have been very busy with the removal of all the apparatus from the Bootle Street and Knott Mill Testing Offices and the fitting up of the new testing-station at London Road, which is now occupied by the department. When negotiations were entered into for new premises by the Justices' Committee, due consideration was given to the future requirements of the department, and the additional work which the proposed amendments of the present Sale of Gas Acts would entail. The new offices will provide accommodation for many years to come.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The financial year of the Dundee Corporation Gas Department closed on the 30th of April, and already there is speculation in the city as to business during the year which has now commenced to run. On Wednesday, the "Dundee Courier" published a statement in which it was said it was not yet known how the accounts stood; but against whatever surplus there might be, there was an amount of £8000 which represented the increase in the price of 60,000 tons of coal which have been purchased this year over the sum paid for coal last year.

From Broughty Ferry it is reported that for a year or two back the policy of the Town Council in relation to the gas-works has been one of the strictest economy, in order to help the speedy wiping off of the big deficit which caused such a commotion; and it was anticipated, when last the estimates were submitted, that this year would see the adverse balance liquidated, or nearly so, through the continuance of the 3s. 6d. rate and retrenchment. As yet there is no word as to the results of the operations for the year which closes on the 15th inst. But, however satisfactory the position may be found, it is pointed out by a writer in a local newspaper that there is little ground for hoping that it would be possible to reduce the price of gas this year. The reason given for making such a forecast is that the coal contracts concluded by the Council are said to involve an increase, in comparison with last year, of nearly £700; and, besides, the price of all other materials required is much enhanced. In the circumstances, it is concluded, consumers will have reason to congratulate themselves if the Council find it possible to keep the rate as at present.

The Perth Town Council on Monday evening considered, in Committee, proposals for a Provisional Order the promotion of which is in contemplation. Among the provisions are to be the increase of the borrowing powers of the Gas Department by £25,000, and authority to make the revenue-producing departments contribute, out of their profits, to the Common Good of the city, for general purposes. It is reported that Lord Provost Cuthbert, the Convener of the Gas Committee, was twitted regarding the Gas Department requiring additional borrowing powers, seeing that they had a Provisional Order solely for the purposes of the Gas Department so recently as last year. The Provisional Order of last year, however, did not increase the capital of the undertaking.

The annual general meeting of the Aberfeldy Gaslight Company was held on Wednesday. It was resolved to retain the price of gas at 6s. 8d. per 1000 cubic feet, with the hope of being able to reduce it next year. A dividend at the rate of 4 per cent. was declared.

The Aberdeen Corporation on Wednesday discussed a proposal, made by a Special Committee, who have been considering the matter for more than two years, in favour of the establishment, under parliamentary authority, of a Corporation superannuation scheme. The scheme is based upon the same lines as one which is said to be in operation in Edinburgh. It was not adopted, but was sent back for further consideration.

In the Dumfries Town Council last week, the Gas Committee, which consists of the whole Council, recommended, among other things, that the tender of Messrs. R. & G. Hislop, of Paisley, for the erection of three settings of eight retorts each, at the price of £799, be accepted; that tenders be procured for the erection of buildings for sulphate plant and the storage of sulphate; and that the tender of Messrs. R. Laidlaw and Son, of Glasgow, for gas-pipes, be accepted. The recommendations were adopted.

It is reported that a successful session's work in ambulance study has been concluded among the men employed in the Dundee Corporation Gas-Works. The class was conducted by Dr. Buist. Out of the class, thirteen men went forward for examination by Dr. Lennox, who has expressed himself as greatly pleased with their appearance.

To-day the members of the Falkirk and District Water Trust made their annual inspection of the water-works, and at the same time inaugurated the new reservoir at Drumbowie. This work marks the completion of an extensive addition to the water-works—an addition which it has taken six years to construct, and which has cost about £135,000. The extension consists of a series of filters and the reservoir, which is capable of containing 125 million gallons; also a new catch-water drain, nearly 3 miles long, by which 1150 acres of new

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gathering-ground have been acquired. Between the new reservoir and that upon the Faughlin Burn—a distance of 6 miles—an 18-inch main has been laid. An additional storage reservoir, to hold 100 million gallons, has been constructed upon Earl's Burn, to provide further compensation to the Carron paper-mill owners, for the extra gathering-ground taken in. These extensions were found to be absolutely necessary to enable the Trustees to meet the ever-increasing wants of the district. The Engineer of the work was Sir W. R. Copland, of Glasgow. The water from the Drumbowie reservoir was turned on by Dean of Guild Neilson.

A Committee of the House of Lords have had under consideration this week the question of who is to continue the supply of water in the Busby district, to the south of Glasgow. There is a Busby Water Company, who are desirous of transferring their business to someone. They first asked the County Council of Renfrew if they would purchase the Company's undertaking; but the County Council declined, and suggested that the Corporation of Glasgow might become the purchaser. This the Corporation agreed to do, and an agreement was come to, in which the price was fixed at £30,000. Then the County Council of Renfrew changed their minds, and they now come forward and offer to acquire the water-works compulsorily, paying the same as Glasgow for them. The County Council are afraid that if the Corporation get the water undertaking into their hands, they will use this fact as an argument to induce a future Parliamentary Committee to give them full municipal authority in the district. There are two Bills before the Committee—one by the Corporation of Glasgow, to authorize them to purchase, and the other by the County Council of Renfrew. A portion of the Busby water area is in Lanarkshire, and the County Council of Lanark also oppose the Glasgow Bill; it being their desire to take over and administer their own territory, in the event of the Renfrew County Council being given the powers they ask. All the evidence has been led; but the Committee have not yet given their decision. A statement of some importance was, however, made yesterday by Mr. Balfour Browne, K.C., the senior Counsel for the Corporation of Glasgow, to the effect that, the Corporation already claiming to have right to supply water in the whole of the area served by the Busby Water Company, if their purchase is sanctioned they will undertake not to charge the maximum rate of 1s. 6d. provided in the agreement, but to at once reduce the water-rate to what the Corporation charge to all suburban districts—10d. in the pound. This offer was characterized by the Chairman of the Committee—the Earl of Camperdown—as a bid to the Committee; but whether it be a bid or not, it should have considerable weight with them. The people in the Busby area are all in favour of the Glasgow Corporation scheme.

The New Mills Urban District Council have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for the erection of two complete single beds of seven semi-regenerative fired retorts, 22 in. by 16 in. and 9 ft. 6 in. long, wtth all the retort mountings and hydraulic mains.

CURRENT SALES OF GAS PRODUCTS.

Week ending May 11.

The London market for tar products is very steady. Pitch is in considerable demand, both for prompt and forward delivery, at improving values. Stocks are unusually light; while there is a probability of 3000 tons being required towards replacing over 6000 tons that have been lost at sea this year. All the indications point to a higher price for pitch. Benzol 90 per cent. is not in an entirely satisfactory position. Still makers are not disposed to accept buyers' figures; but are becoming interested in the supply of this article in place of petrol, for which purpose there are large inquiries. Creosote oil is scarce; and the best makes command 2¾d. to 3d. net naked at works. A good price for this article is assured for some years to come. 60's crude carbolic acid is in request for next half year; and it is understood that the Continental users are willing to pay 1s. 8d. net. Sulphate of ammonia has at last taken an upward turn; and a fair amount of business has been done at a decided improvement in value. The present quotation is £11 17s. 6d., on Beckton terms; and nothing less would be accepted.

Sulphate of Ammonia. LIVERPOOL, *May* 11.

The market remains without material change; current production being sufficient to meet current demand, and there being still second-hand sellers at something less than makers' prices. The announcement of the April export figures does not seem to have affected the situation; it being known all along that shipments would be exceptionally heavy. The closing quotations are £11 13s. 9d. per ton f.o.b. Hull, and £11 16s. 3d. per ton f.o.b. Liverpool and Leith. Interest in the forward position has been rather more serious, and speculative offering abroad has been less in evidence; but the firmness of the large makers has hindered business so far.

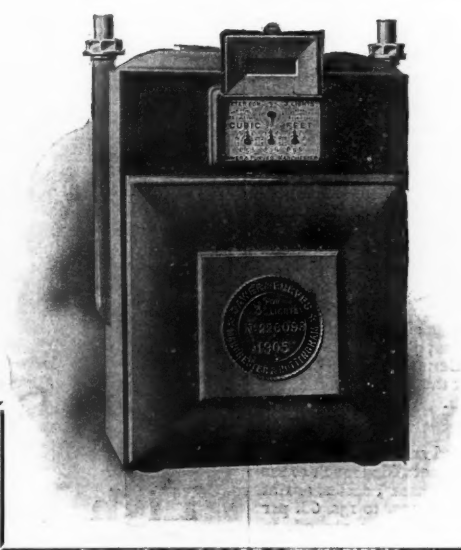
Nitrate of Soda.

This article is quiet on spot at 11s. per cwt. for 95 per cent., and 11s. 3d. for refined quality.

Tar Products. LONDON, *May* 11.

There has not been much alteration in prices during the past week, but figures have been fairly well maintained. Pitch is still steady, with an improving tendency for forward delivery. London manufacturers do not appear to be under any necessity to sell for prompt delivery; while for forward, the prices they are asking are at present beyond the reach of dealers, who find it almost impossible to get Continental buyers to offer any margin for forward delivery to compare with that ruling here. For creosote, the market is still very firm. London oil has been sold at 2½d.; and in most cases makers refuse to quote for forward delivery at present. In the Midlands, 2½d. is reported to have been offered and refused for some of the best makes; and makers are

DRY GAS METERS.



ALL SIZES STOCKED.

SAWER & PURVES,

MILES PLATTING, MANCHESTER.

RADFORD ROAD, NOTTINGHAM.

undoubtedly very well sold. In the North, the finest quality liquid oils are very scarce, and fetching very good prices; but salty oil is reported to have been placed at reasonable figures. Carbolic acid is very quiet indeed. On the east coast, 1s. 7½d. has been accepted for delivery to the end of the year, and Continental buyers refuse to exceed this figure. Crystals are reported to have been sold in small quantities at very low prices, and it is difficult to fix the market values. Benzol is very quiet; and country makes have been sold for delivery in London at very low figures. 50-90 per cent. and toluol are also quiet, and apparently there are no buyers just now. Solvent is steady; but prices offered are not encouraging, especially for forward delivery.

The average values during the week were: Tar, 15s. to 19s.; pitch, London, 26s. nominal; east coast, 25s. to 25s. 6d.; west coast, 24s. to 24s. 6d. Benzol, 90 per cent., 8d. to 10½d.; 50-90 per cent., 10d. to 11d. Toluol, 1s. 1d. to 1s. 1½d. Crude naphtha, 4½d. to 4¾d.; solvent naphtha, 1s. 2d. to 1s. 3½d.; heavy naphtha, 1s. 2d. to 1s. 4d. Creosote, London, 2 7/16d. to 2½d.; North, 2½d. to 2 5/16d. Heavy oils, 2⅝d. to 3d. Carbolic acid, 60 per cent., 1s. 7½d. to 1s. 7¾d. Naphthalene, £6 10s. to £10 10s.; salts, 35s. to 40s. Anthracene, "A" quality, 1½d. to 1¾d.

Sulphate of Ammonia.

Although there has not been very much business doing during the past week, makers report having had rather more inquiry than has been the case for some little time past. London remains unchanged. The principal makers still quote from £11 15s. to £11 17s. 6d. upon their special terms; but outside makes are not fetching over £11 10s. In Hull, business has been done at £11 11s. 3d. to £11 12s. 6d. In Leith, £11 15s. is still offered, but makers are well sold. In Liverpool, from £11 13s. 9d. to £11 15s. may be taken to be the ruling price.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The coal trade of the County Palatine continues on the most advanced scale known for many years. The demand for steam fuel of all kinds is as strong as ever. Recent advances have had no effect in checking it. Gas coal and cannel are being contracted for in large quantities for the ensuing twelve months at increases of from 2s. to 3s., and even more, per ton on last year's contracts. A new seam of coal has been found at Oxton, near Mansfield, and preparations for the sinking of a shaft to work it are proceeding. The North Wales Operative Miners are expected to strike unless the masters agree to a reformed price list and a standard rate of wages. In the Manchester district, the pits will be closed on Tuesday night in Whit week for the following six days for the holidays, and similar arrangements are being made in the Wigan and Tyldesley districts. There is no change in the quotations for coal given in our last issue.

Northern Coal Trade.

There has been a fuller demand for coal—partly through the beginning of the shipments in earnest to the Baltic, and partly in preparation for stocking before the holidays. Hence the prices of coal for early delivery show some firmness. Best Northumbrian steams are from 14s. 9d. to 15s. per ton f.o.b., second-class steams are from 14s. to 14s. 6d., and small steams are rather scarce and firm at from 9s. 9d. to 10s. The collieries are working fairly well, and there is the likelihood of a heavy output during the next few days. In the gas coal trade, the demand is full, and more contracts are coming into the markets. For occasional cargoes, the price of Durham gas coal varies from about 12s. 3d. to 13s. 6d. per ton f.o.b. There are other contracts now settled, and some larger ones in the market, including that of the Newcastle Gas Company, who take from 260,000 to 290,000 tons yearly, and will receive the offers next week, which are sure to be considerably above those of the expiring contracts. Other Northern gas companies are now in the market. The contract for Magona has also been settled, at about 20s. 2d., delivered at Porto Vecchio during the next two months; and there have been sales for Cadiz at a price equal to about 12s. 9d. f.o.b.—but this is on an estimate of the cost of freight, &c. Tenders have also been sent in for the supply for Amsterdam, where there is often keen competition with German coals. Coke is firmer, and gas coke is less plentiful; so that the price is well maintained at about 12s. 9d. to 13s. 6d. per ton f.o.b.

Scotch Coal Trade.

Trade is not so vigorous as it was anticipated only a few weeks ago it would be. Even the opening of the Baltic has not added much to the volume. Prices, in consequence, if not, in some cases, easier, are at least quite stationary. The quotations are: Ell 12s. to 13s. 6d. per ton f.o.b. Glasgow, splint 12s. 6d. to 12s. 9d., and steam 11s. 9d. to 12s. The shipments for the week amounted to 296,310 tons—an increase of 17,769 tons upon the preceding week, and of 5236 tons upon the corresponding week of last year. For the year to date, the total shipments have been 4,579,717 tons—an increase of 108,255 tons upon the corresponding period of 1906.

Gas Suffocation Case at Wolverhampton.—A Wolverhampton hairdresser named Kendall, who was suffering from a painful ailment, was found a few days ago dead on a chair near his gas cooking-stove. His head was resting on the front of the stove; while his mouth was near one of the burners, which was turned on. It was thought that deceased fainted with pain; and the Coroner's Jury returned a verdict of "Death from misadventure."

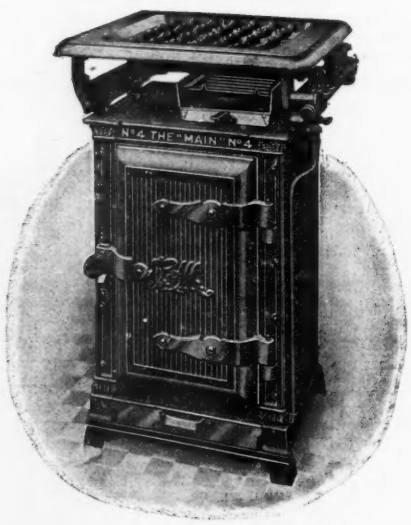
Gas Manager Charged with Embezzlement.—At the Stretton Police Court, a few days ago, a charge of embezzling £1 11s. 7d., the money of the Church Stretton Gas Company, Limited, was preferred against Edward Short, the Manager and Secretary of the Company. Formal evidence was given by the Head Clerk to the Company and by Sergeant Fletcher, who effected the arrest. Defendant was remanded till the next Petty Sessions; bail being allowed.

SEASON 1907.

The "MAIN"

Gas

Cookers



High Grade Cookers.

Beautifully Enamelled.

R. & A. MAIN, LIMITED,

LONDON, GLASGOW, AND FALKIRK.

ALSO AT

BIRMINGHAM, BRISTOL, MANCHESTER, MELBOURNE, AND SYDNEY.

Sale of Stocks and Shares.

Four new issues of capital were placed by Mr. Alfred Richards, under instructions from Directors, at a sale conducted by him at the Mart, Tokenhouse Yard, E.C., last Tuesday. Consolidated 5 per cent. stock of the Uxbridge Gas Company, to the amount of £7250, entitled to a dividend at the rate of 4½ per cent. per annum, was sold at from £86 to £91 per £100 of stock. Some £10 "C" shares and £1500 of 4 per cent. perpetual debenture stock of the East Grinstead Gas and Water Company were next offered. The shares, entitled to £6 6s. per cent. per annum, free of tax, fetched from £12 5s. to £12 12s. 6d. each; and the stock was all sold at £102 per £100. Some new £10 "B" shares (maximum dividend 8 per cent.) in the Tendring Hundred Water Company, carrying 4½ per cent. dividend from the 1st prox., were sold at par. A new issue of 700 ordinary £10 shares in the Barking Gas Company, carrying the maximum dividend of 7 per cent. per annum from the 1st prox., was placed at from £13 5s. to £14 2s. 6d. per share. The next day, at a sale by auction at Dunstable, one £10 water share in the Dunstable Gas and Water Company realized £18, and two £10 gas shares were sold for £15 2s. 6d. each.

Progress of the Teignmouth Gas Undertaking.

Mr. J. A. Gray, the Manager of the Teignmouth Gas-Works, presented his annual report and the balance-sheet for the year ended May 31, at a meeting of the District Council last Tuesday. They showed that the gross profit was £2019, which was equal to 12·56 per cent. on the present capital of the undertaking. After meeting the charges for interest and sinking fund, there remained a net profit of £436, which with the balance from last year brought the amount up to £916 to the credit of the revenue. The chief feature of the year was the large increase in the output of gas as compared with any previous twelve months. This was due to the introduction of slot-meter installations, and the considerably extended use of gas for cooking which had followed upon a gas exhibition held last summer. The total quantity of gas made was 37,754,000 cubic feet, an increase of 7,210,000 cubic feet, equal to 23·6 per cent. The unaccounted-for gas was 9·91 per cent. of the output, which was a reduction of 1·46 per cent., and the lowest figure yet recorded. With regard to the financial position generally, Mr. Gray pointed out that last year's coal contract was less favourable by 1s. per ton than that for 1905-6, and this increased the expenditure by £183; while rates and taxes showed a rise of £157, owing to the fact that two years' income-tax was included. The price of gas was reduced 2d. per 1000 cubic feet at the commencement of the financial year, representing a reduction of £225 on the returns for gas sold to private consumers. The wisdom of cheapening the supply had been amply demonstrated by the increased revenue which had resulted. During the year the work of telescoping the gasholder had been carried out.

Testing the Wandsworth and Putney Company's Gas.

At the meeting of the Wandsworth Borough Council last Wednesday, correspondence was submitted which had taken place between the Council's Gas Examiner and the Engineer of the Wandsworth and Putney Gas Company (Mr. H. O. Carr) with regard to testings of gas. As already reported in the "JOURNAL" (*ante*, p. 38), the Council's Gas Examiner stated that, on Jan. 23 and 24, the results of his tests at the Putney station showed the illuminating power of the gas to be 12·8 and 13·6 candles respectively; the standard being 14 candles. The Company's Engineer, in reply to this, stated that the gas sent out from the works during the testing hours was above the standard; but that, owing to the intensely cold weather prevailing at the time, there had been condensation of liquor and formation of naphthalene, which meant that the gas was robbed of its illuminating power after leaving the works. He added that the gas was officially tested with the temperature considerably below 60° Fahr., and that this, coupled with the fact that the barometer was exceedingly high, gave a very large reduction to the actual illuminating power. A letter on the subject from the Company's experts (Messrs. Willliam Sugg and Co.) was enclosed. The Gas Examiner stated that he was unable to agree that the cold weather had anything to do with the inferior gas on the dates in question. The consideration of the communications was postponed at the previous meeting of the Council. Since then the Gas Examiner had tested, on March 19, the gas supplied by the Company at the Putney testing-place, and had certified that it was of an illuminating power of only 13·9 candles. The Company's Engineer, when asked for an explanation, wrote stating that they could not accept the Gas Examiner's report as a criterion of the illuminating power of the gas; as during the testing hours it was of an average of 14·89 candles corrected; and was never below 14·5 candles, and reached 15·2 candles corrected. In answer to this, the Council's Gas Examiner stated that the illuminating power at the testing-place was as reported by him; that three tests were made between 5 p.m. and 7.30 p.m., and were 13·85, 13·75, and 13·76 candles, or an average of 13·79 candles uncorrected, equal to 13·93 candles corrected. He added that the apparatus was carefully tested, and found to be in perfect order. The General Purposes Committee, who had considered the whole of the letters received, recommended that the Gas Company be informed that the Council were satisfied as to the accuracy of their Gas Examiner's report, and that in the event of a recurrence of any deficiency in the illuminating power of the gas the Council would have to consider as to taking proceedings. The recommendation was adopted without discussion or dissent.

New York Water Supply.—As Greater New York now stands, less than one-half of 1 per cent. of the water of the boroughs of Manhattan and the Bronx is supplied by a private Company; the rest by the City. About 93 per cent. of Brooklyn is supplied by the City, the remainder by private Companies. Queens is supplied largely from wells—30 per cent. owned by the City, and 70 per cent. by individuals and private corporations.

Simple Addition!

1 George Glover Meter
1 Richmond Cooker
1 Pendant
2 Brackets

14,000 cub. ft. per annum.

For Installation Prices write RICHMOND'S

WARRINGTON,
LONDON,
ETC.

Sir George Livesey on Profit-Sharing.

At the dinner of the Political and Economic Circle of the National Liberal Club on Monday last week, the subject for discussion was "Profit-Sharing and National Insurance as a Solution of the Labour Question." Mr. Henry Vivian, M.P., presided, and in opening the discussion read a letter from Sir George Livesey, who apologized for his absence. Sir George traced the history of profit-sharing in the South Metropolitan Gas Company, and pointed out that last year 4993 employees held £250,559 of the Company's stock. They had deposited with the Company at interest £59,650, and owned their houses to the value of £24,300—a total holding in the Company by the employees of £334,709. Mr. Guy M. Nicholson, F.S.I., read a paper on the subject, in which he said that profit-sharing would give every man an interest in his work, would tend to produce better work, and would discourage idleness. He advocated a national insurance fund, to which everyone should be obliged to contribute in proportion to his income. Mr. E. Hatzfeld maintained that in proportion as bonuses on labour went up, so would wages go down. Mr. C. C. Carpenter, Engineer to the South Metropolitan Gas Company, strongly combated the view that profit-sharing reduced wages. He said men under the profit-sharing system occupied an entirely different relation to the management from that held if they were simply wage-earners. Profit-sharing taught working men the industrial basis on which the fabric of the country stood. Mr. Aneurin Williams advocated a system of co-operative profit-sharing among working men themselves, which was, he said, really produce-sharing.

Tarapaca Water Company, Limited.—In their report for the year ended Dec. 31 last, the Directors of the Tarapaca Water Company, Limited, state that, after debiting £5000 to the profit and loss account for doubtful debts, the net profit for the year amounts to £55,248. Adding the balance brought forward (£7369) and allowing £743 for income-tax, a total to the credit of profit and loss of £61,873 is produced. An interim dividend was paid on Oct. 1 last at the rate of 3½ per cent., absorbing £14,000, and leaving £47,873 to be dealt with. The Directors recommend a final dividend of 4 per cent., making 7½ per cent. for the year, and the placing of £10,000 to the reserve fund, which will then amount to £45,000. This will leave a balance of £21,873 to be carried forward.

Water Supply in North Warwickshire.—The North Warwickshire Water Company, Limited, who have for several years past given a supply to some parishes abutting on Coventry, are about to furnish water to certain districts (Knowle, Dorridge, and Hampton-in-Arden) near Birmingham. The Company's wells are at Kersley, whence the water is lifted to reservoirs at Corley, and a further reservoir is about to be constructed at a level of about 600 feet above Ordnance datum. The new engines just installed, in duplicate, are triple-expansion surface condensing engines of the Worthington type, each capable of lifting 500,000 gallons per 24 hours to the high-level reservoir at Corley Top. The boilers are also in duplicate. The works were designed by, and carried out under the supervision of, the Company's Consulting Engineers, Messrs. Joseph Quick and Son.

Explosions in Street-Boxes.—The Wandsworth and Putney Gas Company have written to the Wandsworth Borough Council relative to explosions caused by accumulations of gas in telephone and electric light street-boxes. The Company complain that there is no proper ventilation of the boxes, and suggest that, with a view of preventing the accumulations referred to, each box should be filled with some light and easily removable material, and that the ends of the pipes carrying the lines into the chamber should be sealed with plaster or clay; and they ask the Council to co-operate with them in the matter, and make representations to the proper authorities. The Highways Committee of the Council, to whom the communication was referred, have decided to call the attention of the Postmaster-General, the London County Council, and the County of London Electric Supply Company, Limited, to the matter.

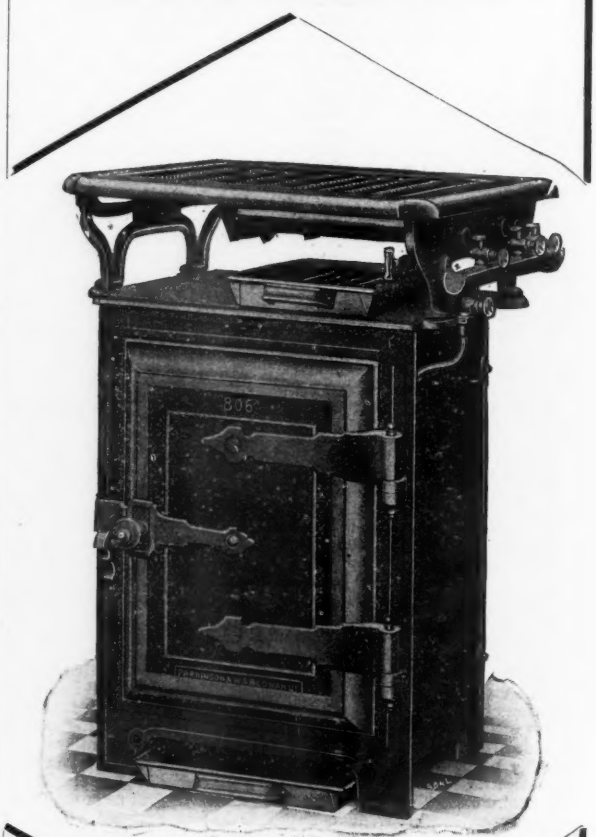
Devonport Water-Works.—A report has been prepared for the information of the Devonport Town Council on the working of the water undertaking during the first nine months of its possession by the Corporation. The undertaking was transferred in June, 1906, from which time to the 31st of March last the gross income was £13,784 and the working expenses were £4477; leaving a balance on the actual trading of £9307. Of this sum, £8361 was required for interest on loans and £865 for the third instalment of the cost of obtaining the Water Act; leaving a net profit of about £80, which was carried to a reserve fund. The average daily supply of water is 2,261,360 gallons, or 32·30 gallons per head of the population. There are 8605 connections and 60 miles of mains. The capital employed is £282,383, or £448 10s. 1d. per million gallons; and the gross profit of the first nine months works out at 4·39 per cent. per annum on the capital employed.

Proposed New Water Supply for Holsworthy.—On behalf of the Local Government Board, Mr. E. A. Sandford Fawcett recently held an inquiry at Holsworthy with reference to an application by the District Council for power to borrow £3900 for works of water supply. Mr. W. C. R. Peterson, the Clerk to the Council, explained that the impounding reservoir would be situated on land at Hollacombe, and that the Council would pay £200 on signing the lease, and a rental of £15 for the catchment area and of £7 10s. for the site of the reservoir. It was proposed to lay pipes along the London and South-Western Railway line and pay the Company £5 12s. 6d. per annum for the privilege. The Inspector asked what would happen if the Company gave the Council three months' notice to quit; and he pointed out that there was nothing in the agreement as to the ownership of the pipes if the Council had to leave. Mr. J. Chadwick, the Engineer of the scheme, said the arrangement with the Company was a weak spot, but it was adopted because it offered a shorter route and obviated the necessity of pumping. The impounding reservoir would have a capacity of 909 million gallons, and would have an earth embankment 10 feet high. There would be a covered service reservoir with a capacity of 375,000 gallons, and three filter-beds to deal with 30,000 gallons of water per day. The present sources of supply are shallow wells, most of which were stated to be polluted.

PARKINSON'S

SLOT

COOKERS.



NEW DESIGNS.

Particulars on Application.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),

COTTAGE LANE, CITY ROAD, LONDON.

BELL BARN ROAD, BIRMINGHAM.

Yeovil Gas Undertaking.—In the year ending the 31st of March last, the sale of gas in Yeovil to ordinary consumers was 43,479,000 cubic feet; to prepayment meter consumers, 15,247,600 cubic feet; and for street lighting, 4,500,000 cubic feet. Adding 3,183,400 cubic feet for the gas used on the works and waste, the total of 66,410,000 cubic feet is reached. The revenue was £14,248; and the expenditure, £9366—leaving a balance of £4882. After paying interest, the instalment of loans, and income-tax, there was at the end of the financial year a balance of £67.

The Eastern Counties Association Meeting at Lincoln.—Upon the minutes of the Gas Committee coming up for consideration at the quarterly meeting of the Lincoln City Council, the Mayor (Colonel Ruston) alluded to the meeting of the Eastern Counties Gas Managers' Association in the city, and paid a tribute to Alderman Wallis and Mr. Carter for the arrangements which had been made for the guests. In reply, Alderman Wallis referred to the help derived from attending such conferences as these. Their profits, he thought, were largely due to information gained from such gatherings.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

LEAFLETS FOR PERIODICAL DISTRIBUTION.

"ILLUMINATING TRUTHS FOR HOUSEHOLDERS." Nos. 1, 2, 3, and 4 NOW READY.

No. 1.—"The Sanitary Aspects of Gas and Electric Lighting."
No. 2.—"The Cleanliness of Illuminants: The Eyesight."
No. 3.—"Fire Risks."
No. 4.—"The Relative Cost of Gas and Electricity, and Matters affecting it."

This series of Leaflets will be useful, not only for distribution among Householders generally, but for circulation among Shareholders to fortify them with arguments in defence of the commodity in which they have invested capital.

Prices for Quantities on Application to WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

Situations Vacant.

GAS MANAGER. Dewsbury Corporation. Applications by May 23.
GAS AND WATER MANAGER. Tyldesley-with-Shakerley Urban District Council. Applications by May 20.
COMMERCIAL MANAGER, MANUFACTURING COMPANY. No. 4765.
ENGINEER-MANAGER FOR COKE OVENS. No. 4771.
DRAUGHTSMAN. W. C. Holmes and Co., Huddersfield
DISTRIBUTION FOREMAN. No. 4770.
CHARGE OF OFFICE WORK, &c. Holyhead Gas Works.
RETORT SETTER. Burslem Gas-Works.

Situations Wanted.

GAS STOVE AND METER REPRESENTATIVE. No. 4767.
MANAGER. No. 4769.
MANAGER. No. 4772.

Tank-Waggons for Hire.

CLAYTON ANILINE COMPANY.

Plant (Second-Hand), &c., for Sale.

PURIFIERS, &c. Southwell Gas-Works.

Stocks and Shares.

COMMERCIAL GAS COMPANY. June 4.
HARROGATE GAS COMPANY, (By tender.) May 28.

TENDERS FOR

Benzol and Benzolized Creosote.

DARWEN GAS DEPARTMENT. Tenders by May 25.
LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.

Boilers.

NELSON GAS DEPARTMENT. Tenders by May 24.
WOLSTANTON GAS DEPARTMENT. Tenders by May 25.

Coal and Cannel.

BEVERLEY GAS DEPARTMENT. Tenders by May 29.
BURTON-ON-TRENT TOWN COUNCIL. Tenders by May 23.
BUXTON GAS DEPARTMENT. Tenders by May 22.
CLITHEROE GAS DEPARTMENT. Tenders by May 21.
DEVONPORT GAS DEPARTMENT. Tenders by May 24.
EAST DEREHAM GAS DEPARTMENT. Tenders by June 3.
FARNHAM GAS COMPANY. Tenders by June 1.
GLOUCESTER GAS COMPANY. Tenders by May 28.
LEEDS GAS DEPARTMENT. Tenders by May 23
LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.
LURGAN GAS COMPANY. Tenders by June 3.
MANSFIELD GAS DEPARTMENT. Tenders by May 28.
RHYL GAS DEPARTMENT. Tenders by May 28.
RICHMOND WATER DEPARTMENT. Tenders by May 27.
RICKMANSWORTH GAS DEPARTMENT. Tenders by May 29.
ROMFORD GAS COMPANY. Tenders by May 23.
SKIPTON GAS DEPARTMENT. Tenders by May 31.
SWADLINCOTE GAS DEPARTMENT. Tenders by May 28.

Condenser.

WOLSTANTON GAS DEPARTMENT. Tenders by May 25.

Exhausters and Engines.

WOLSTANTON GAS DEPARTMENT. Tenders by May 25.

General Stores, Ironmongery, Drysaltery, Compo. Pipe, Lead, Paint, Shovels, Forks, Oils.

LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.

Lime.

BURTON-ON-TRENT TOWN COUNCIL. Tenders by May 23.
LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.
SWADLINCOTE GAS DEPARTMENT. Tenders by May 28.

Pipes, &c.

CHORLEY GAS DEPARTMENT. Tenders by May 21.
DARWEN GAS DEPARTMENT. Tenders by May 25.
LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.
SPALDING GAS DEPARTMENT. Tenders by May 22.

Pumps.

WOLSTANTON GAS DEPARTMENT. Tenders by May 25.

Purifiers.

WOLSTANTON GAS DEPARTMENT. Tenders by May 25.

Scrubber-Washer.

WOLSTANTON GAS DEPARTMENT. Tenders by May 25.

Sulphuric Acid.

LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.

Tar and Liquor.

BURTON-ON-TRENT TOWN COUNCIL. Tenders by May 23.
BUXTON GAS DEPARTMENT. Tenders by May 22.
DARWEN GAS DEPARTMENT. Tenders by May 25.
LEIGH GAS DEPARTMENT. Tenders by May 18.
MANSFIELD GAS DEPARTMENT. Tenders by May 23
SKIPTON GAS DEPARTMENT. Tenders by May 31.
STOCKPORT GAS DEPARTMENT. Tenders by May 22.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 441.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	19 20	..	5 5 0
268,324	10	,,	7½	Do. 7 p.c.	14–15	..	5 0 0
200,000	5	Nov. 14	7	Bombay, Ltd.	6¾–7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	5–5⅛	..	5 1 10
50,000	10	Feb. 28	14	Bourne-mouth Gas and Water } 10 p.c.	27½–28½	..	4 18 3
51,810	10	,,	7	} B 7 p.c.	16½–17	..	4 2 4
53,200	10	,,	6	} Pref. 6 p.c.	15–16	..	3 15 0
380,000	Stk.	,,	12½	Brentford Consolidated	248–253	..	4 18 10
300,000	,,	,,	9⅜	Do. New	190–195	..	4 17 5
50,000	,,	,,	5	Do. 5 p.c. Pref.	117–122	..	4 2 0
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb.	101–104	..	3 16 11
220,000	Stk.	Mch. 14	11½	Brighton & Hove Orig.	220–225	..	5 0 0
246,320	,,	,,	8½	Do. A. Ord. Stk.	160–165	..	5 0 0
460,000	20	Apl. 11	10	British	42½–43½	..	4 11 11
104,000	Stk.	Feb. 28	6	Bromley, Ord. 5 p.c.	119–122	..	4 18 4
165,700	,,	,,	4½	Do. do. 3½ p.c.	90–93	..	4 16 9
500,000	10	Oct. 12	7	Buenos Ayres (New) Ltd.	11⅛–12	..	5 16 8
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb.	91–96	..	4 3 4
150,000	20	Mch. 14	8½	Cagliari, Ltd.	24–26	..	6 6 11
100,000	10	Sept. 27	10	Cape Town & Dis., Ltd.	12–14	–1½	7 2 10
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	8½–9½*	..	4 14 9
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	50–52*	..	5 15 5
50,000	Stk.	Dec. 28	4½	Do. 4½ p.c. Deb. Stk.	56–98	..	4 11 10
157,150	Stk.	Feb. 28	5	Chester 5 p.c. Ord.	109–111	..	4 10 1
1,443,280	Stk.	,,	5⅝	Commercial 4 p.c Stk.	107–110	..	4 14 6
560,000	,,	,,	5	Do. 3½ p.c. do.	103–106	–2	4 14 4
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	83–85	..	3 10 7
800,000	Stk.	,,	6½	Continental Union, Ltd.	119–122	..	5 6 7
200,000	,,	,,	7	Do. 7 p.c. Pref.	138–143	..	4 17 11
462,170	Stk.	—	5½	Derby Con. Stk.	122–124	..	4 8 9
55,000	,,	Jan.	4	Do. Deb. Stk.	103–105	..	3 16 2
486,090	10	Jan. 31	11	European, Ltd.	24–25	..	4 8 0
354,060	10	,,	11	Do. £7 10s. paid	18–19	..	4 6 10
13,203,110	Stk.	Feb. 14	4⅛	Gas-light & Coke } 4 p.c. Ord.	93–95	–2	4 12 7
2,600,000	,,	,,	3½	} 3½ p.c. max.	87–89	..	3 18 8
3,799,735	,,	,,	4	} 4 p.c. Con. Pref.	104–106	..	3 15 6
4,193,975	,,	Dec. 13	3	} 3 p.c. Con. Deb.	83–85	..	3 10 7
258,740	Stk.	Mch. 14	5	Hastings & St. L. 3½ p.c.	95–100	..	5 0 0
82,500	,,	,,	6½	Do. do. 5 p.c.	116–119	..	5 9 3
70,000	10	Apl. 26	11	Hongkong & China, Ltd.	15–20*	..	5 10 0
4,940,000	Stk.	Nov. 14	8	Imperial Continental	176–179	–1	4 9 5
473,600	Stk.	Feb. 14	3½	Do. 3½ p.c. Deb. Red.	93–95	..	3 13 8
184,602	Stk.	Mch. 14	6	Lea Bridge Ord. 5 p.c.	1·7–122	..	4 18 4
306,083	,,	Dec. 28	4	L'rpool Unit'd Deb. Stk.	110–112	..	3 11 5
561,000	Stk.	Feb. 28	10	Liverpool United A	223–225	..	4 8 11
718,100	,,	,,	7	Do. B	164–165	..	4 4 10
144,140	Stk.	Feb. 14	7⅞	Maidstone 5 p.c.	142–147	..	5 3 8
75,000	5	Nov. 29	5	Malta & Medn., Ltd.	4¼–4½	..	5 5 3
560,000	100	Apl. 2	5	Met. of } 5 p.c. Deb.	100–102	..	4 18 0
250,000	100	,,	4½	Melbourne } 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	Nov. 14	3½	Monte Video, Ltd.	11½–12½	..	5 12 0
1,775,892	Stk.	Feb. 28	4⅜	Newc'tle & G'tesh'd Con.	106–107	–½	4 6 5
406,025	Stk.	Dec. 28	3½	Do. 3½ p.c. Deb.	96–97	..	3 12 2
15,000	10	Feb. 28	10	North Middlesex 10 p.c.	19½–20½	..	4 17 7
55,940	10	,,	7	Do. 7 p.c.	13–14	..	5 0 0
300,000	Stk.	Apl. 26	8	Oriental, Ltd.	148–153*	..	5 4 7
60,000	5	Mch. 27	7	Ottoman, Ltd.	6–6½	..	5 7 8
398,490	5	Oct. 26	7	Primitiva Ord.	7–7½	–⅛	4 13 4
796,980	5	Jan. 31	5	Do. 5 p.c. Pref.	5–5½	..	4 15 3
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	95–97	..	4 2 6
1,000,000	10	Apl. 26	8	River Plate Ord.	12¾–13¼*	..	6 0 9
312,650	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	95–97	⅛	4 2 6
250,000	10	Mch. 27	8	San Paulo, Ltd.	12½–13	..	6 3 1
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	48–50	..	5 0 0
135,000	Stk.	Mch. 14	10	Sheffield A	245–247	+1	4 1 0
209,984	,,	,,	10	Do. B	245–247	+1	4 1 0
523,500	,,	,,	10	Do. C	245–247	+1	4 1 0
70,000	10	Oct. 26	10	South African	15⅝–16½	..	6 1 3
6,350,000	Stk.	Feb. 14	5½	South Met., 4 p.c. Ord.	123–125	..	4 8 0
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	81–83	–1	3 10 7
201,720	Stk	Mch. 14	8	South Shields Con. Stk.	158–160	..	5 0 0
605,000	Stk.	Feb. 28	5½	S'th Suburb'n Ord. 5 p.c.	120–123	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref.	120–123	..	4 1 4
117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	125–130	..	3 16 11
502,310	Stk.	Nov. 14	5	Southampton Ord.	107–112	..	4 9 3
120,000	Stk.	Feb. 28	6½	Tottenham and } A 5 p.c.	123–126	..	5 3 2
398,940	,,	,,	5	} B 3½ p.c.	101–103	..	4 17 1
137,500	,,	Dec. 28	4	Edmonton } 4 p.c. Deb.	101–103	..	3 17 8
182,380	10	,,	8	Tuscan, Ltd.	10½–11	..	7 5 6
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	102–104	..	4 16 2
193,742	Stk.	Feb. 28	5	Tynemouth 5 p.c. max.	105–107	..	4 13 6
30,000	Stk.	Feb. 14	8	Wands-worth } A 5 p.c.	—	..	—
255,636	,,	,,	6½	} B 3½ p.c.	135–140	..	4 12 10
75,000	,,	,,	5⅜	and } C 3½ p.c.	111–113	..	4 19 1
79,416	,,	Dec. 28	3	Putney 3 p.c. Deb. Stk	79–82	..	3 13 2
843,872	,,	Feb. 28	5⅛	West Ham 5 p.c. Ord.	101–104	..	4 18 6
185,000	,,	,,	5	Do. 5 p.c. Pref.	120–123	..	4 1 4
228,300	,,	Dec. 28	4	Do. 4 p.c. Deb. Stk.	102–105	..	3 16 2

Prices marked * are "Ex div."

Cost of Public Lighting at Worcester.—In the course of his annual statement with reference to the finances of the city at the meeting of the Worcester City Council last Tuesday, Alderman Millington again referred to the large amount required for public lighting. The estimated expenditure on this account in the present year is: For gas lighting, £2650—a reduction of £74 on last year's expenditure; and for electric lighting, £1800—an increase of £37. An additional sum of £20 is put down for altering the position of lamps. The total of £4470 is equal to a rate of 5d. in the pound; and Alderman Millington expressed the opinion that the matter calls for the serious attention of the Lighting Committee. The expenditure is about 30 per cent. more than before the introduction of electric lighting; and though the city is more brilliantly lighted—at least, as regards certain main thoroughfares—than it used to be, the burden on the rates is undoubtedly large. From the ratepayers' point of view, the electric lighting business has been particularly unfortunate. It has not only led to this increase in the expenditure on lighting, but to a rise in the rates in other directions. Last year there was a deficit on the working of the undertaking of £287, which, added to previous deficits, makes a total loss of £6323. Against this have to be set profits of £1400; leaving a net deficit on the twelve years' working of £4923, or an average of £410 per annum.

Gas-Works Results at Southport.—There is a profit on the Southport gas undertaking for the past year of slightly over £13,000, after placing £3000 to the reconstruction account. In the preceding year, the sum placed to this account was £2000, and the profit was £13,605. Practically the whole of the profits will be handed over in relief of the borough rates.

Mr. J. W. Hall has been appointed representative of the Davis Gas-Stove Company, Limited.

Mr. Henry Peaty, the Managing Director of the New Conveyor Company, Limited, has undertaken the representation of the Company in the Lancashire and Yorkshire districts.

Mr. R. S. Ramsden, the Manager of the Burton-upon-Trent Gas-Works, is following up vigorously the efforts made by his late father to push the sale of coke and breeze and encourage the use of gas-stoves in the town. He has adopted the plan of inserting suitable advertisements in the local papers on alternate nights, and of facilitating orders by sending out with all the gas accounts cards (on the reply post-card plan) containing prices. Non-users of gas-stoves are being freely circularized.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

WHITSUNTIDE HOLIDAY.

In consequence of the WHITSUNTIDE HOLIDAY, Communications for the next issue of the "JOURNAL" and Orders respecting ADVERTISEMENTS should be received at the Office NOT LATER than the FIRST POST ON SATURDAY.

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